The Automobile

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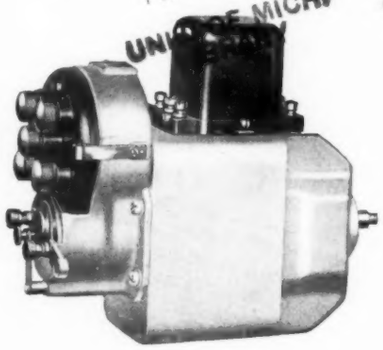

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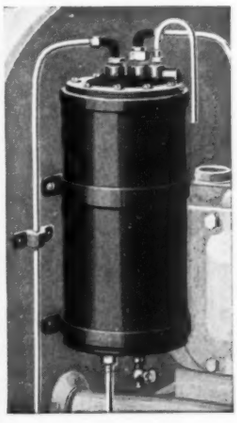
M. E. R.

Norfolk, Va.

—Gravity feed, though usually efficient in level districts, sometimes fails to give best results when ascending steep grades. Even if entirely efficient, gravity feed requires location of the main gasoline tank either in the cowl or under the front seat, locations both dangerous and inconvenient. Pressure feed requires an elaborate system of tubing and pressure pump, and needs constant attention on the part of the driver. Leaks are frequent. Its construction permits carrying the gasoline tank in the rear where it belongs, while at the same time forces the gasoline to the carbureter faster than needed, resulting in waste because of unconsumed gas. Vacuum feed permits carrying the main gasoline tank in the right place, that is, in the rear, and carries gasoline unfailingly to the carbureter, without attention. A saving of gasoline consumption of from 10 to 12 per cent is shown over pressure feed, although no saving in fuel consumption is shown over gravity feed.



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VOL. XXXIV NEW YORK—THURSDAY, FEBRUARY 3, 1916—CHICAGO NO. 5

The Automobile

Driver's Lot 99% Discomfort

Although Driver Is Most Often Owner, Comfort of Tonneau Occupants Is More Studied—Entrance and Seating Positions Ill-Considered

By J. Edward Schipper

WHY has the owner-driver been neglected and all the brains and genius of the body builder been concentrated on his wife, children, invited guests and other occupants of the tonneau? Why do we have 21-in. doors on our automobiles and then have to compress our anatomies sufficiently to squeeze our bodies, along with a heavy driving coat, through a space of 7 in. between steering wheel and body combing? Why do we have luxuriously lounging driving seats in which we can repose comfortably, when the car is standing at the curb, but in which we cannot drive for any time without an aching neck due to continuous craning to see the road around, above or below the wide rim of the steering wheel?

There are a multitude of things that go to make a car comfortable, and the hundreds of dollars worth of upholstery placed on a fine body can be set at naught by the neglect of the little details. For several years the exterior appearance of the car has been the study of hundreds of engineers and artists in this country and abroad. Is it not possible that in our race after beauty of outline, we have neglected the, perhaps more important, comfort of the interior?

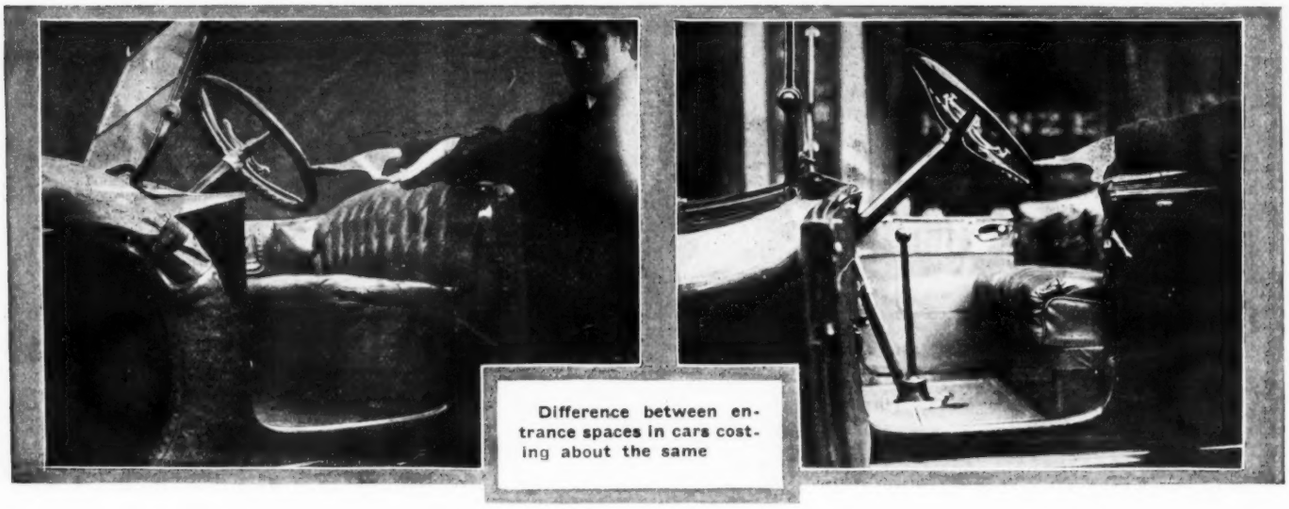
Ninety per cent of the cars in this country are driven by their owners. This means that on all but 10 per cent, the owner of the car is sitting in the driver's seat. This condition is worthy of thought because it means that some of the attention which produces comfort should be focussed on the seat occupied by the man to whom it is most essential that the comforts of motoring should appeal. As the matter stands now he is not only uncomfortable while driving, but on entering or leaving the car, especially with a heavy coat, he is compelled to perform a series of contortions the inconvenience of which is limited only by the narrowness of his waist-line.

The difference between leaning to make a gear change and changing gears in erect position

After having forced an entrance to the car with an effort that is destructive to coat buttons and patience, the next consideration is the sitting posture. On some cars, the driver leans back, on a great majority he sits as erect as the drum major of a crack military band, on a few others he is actually leaning *forward*. The erect position is fair. It is more comfortable to lean back slightly so as to take a little strain off the spinal column, but it certainly bad to lean forward.

There are many other detail considerations that actually mean comfort or discomfort to the driver, and it must be always remembered that he is generally the man who has bought the car. The position in shifting gears, the amount of reach to get at the emergency lever, the width of the seat, elbow room on the left side in the left-drive car and the position of the feet in driving.

All the trouble is not in the driv-



Difference between entrance spaces in cars costing about the same

er's seat however, although it must be conceded that most of it is. The occupant of the tonneau is quite comfortable in most of the cars, but there are exceptions in cars in which considerable expense has been gone to in providing good upholstery. For instance the camber or curve of the seat in conjunction with the camber of the back rest form a combination which must be just right, or else the occupant of the car, if he is of ordinary stature will quit his seat after the end of a long day's ride with a feeling of relief instead of regret. It is recognized that it is impossible to turn out the bodies of stock cars in the same manner as a tailor fitting suits of clothing, on the other hand, the designer must work to the needs of the person of ordinary stature. Since the tonneau seat must accommodate persons of varying heights and degrees of embonpoint, it is necessary to use care that the camber of seat and back rest do not make the seat uncomfortable to any except the one person that it fits.

To secure accurate data on some of the details which go to make a car comfortable and convenient, a number of measurements have been taken on representative 1916 cars. These measurements have been made for the purpose of bringing comparisons and recommendations down to a definite basis, thereby giving something which may be worked from in designing a body that will eliminate the maximum number of difficulties which are sure to crop up if these little points are neglected.

The measurements taken are shown on the accompanying charts and the tabulations show the actual dimensions of the points noted on the diagrams, in inches. Several inches variation will be noted in several of the columns, and in many of the instances the difference of 1 or 2 in. was the determining factor as to whether the particular point referred to was one of the factors of comfort or discomfort in the design.

Movable Steering Wheel

THE possibility of the non-stationary wheel should be carefully considered. The use of a universal joint at the base of the steering column, a folding wheel that is not clumsy or a telescopic column with adjustable rake are all possibilities, and when any manufacturer puts one of these arrangements or another on his car so that when the driver enters or leaves the car he can push the steering column out of the way, he thereby obtains a talking point which will appeal to every motorist who ever drove his own car.

Squeezing into the driver's seat—This car had more room than most others

Narrow Space Exhausts Patience

The dimension at *A* is the distance from the steering wheel to the seat. It varied all the way from 7 in. to 10 in. on the various cars, and the further away from 7 and the nearer 10 the distance, the more comfortable is the car for a person wearing a heavy coat. There is no advantage in having the steering wheel scraping across the lap of the driver. In entering the car the distance at *A*, is all important. Take the salesman, for instance, who is using the car to make a number of calls necessitating his entering and leaving the car several times during the course of a comparatively short drive; or, take the doctor, or the man on a shopping tour with his wife, or the lady herself; every one of these is compelled to squeeze his or her body and a mass of clothing through a 7-in. space every time he or she leaves or enters the car.

There have been men who have raved against the discomfort of the car under these circumstances, especially in winter when fur coats are the rule. And, since winter driving is becoming the rule and not the exception, this extra thickness of coat must be taken into consideration in determining these dimensions. From the thirty or more cars experimented upon, one could not fail to come to the conclusion that the measurements had been determined in a great many cases by a very thin person clad in very scanty garments.

The distance from the bottom of the steering wheel to the seat should be 9 in., and the driving seat is not convenient and comfortable for even an average person unless it is at least that.

The distance *R*, is closely allied to that at *A*, and is measured from the edge of the door passage to the nearest point on the steering wheel. It is the narrowest part of the entrance through which the

Recommended Dimensions for Comfort

Part of Car	Key Letter on Chart	Dimension in Inches
Wheel to front seat vertically	A	9
Wheel to seat back, horizontally	B	16
Front seat height, vertically	C	14
Shifter to seat, horizontally	D	6
Center of wheel height, vertically	E	27
Pedal to seat, horizontally	F	19
Shifter lever handle height	G	19
Brake lever to seat, horizontally	H	12
Level line of eye and wheel top	J	Over
Must one lean to shift gears	K	No
Must one lean to apply emerg'ncy.	L	No
Width of front door	M	21
Position of driver in seat	N	*
Transverse distance sill to shifter	O	18
Transverse distance sill to brake	P	20
Width of front seat for driv'r only.	Q	18
Entr. space bet. wheel and side	R	11
Front seat back to rear seat	S	†27
Height of rear seat	T	14 to 17
Depth of rear seat	U	21
Width of rear seat	V	‡46
Width of rear door	W	21

*Not quite erect. †For five passengers. ‡For three passengers.

driver must squeeze in entering the car. Here the distance runs down to 4 in. on one car, 5 in. on another and 7 in. on several. The driver actually has to pass through this space before he can sit down. The car is equipped, taking the 5-in. case as an example, with an 18-in. door. Of what use is the wide door when directly inside it is a passage less than one third the width?

The front door must not only be of good width in order to make it an asset to the car but it must also be far enough back so that when it is open there is no interference with entrance. This can readily be done as shown by car No. 4. In this car the width of the front left door is 20 in., the distance *A*, from steering wheel to seat, is 8 in., which is fair and the important distance *R*, which measures the ability of the driver to enter the car comfortably and quickly, is 11 in. This is good. The *R* dimension is secured by having the door carry away that part of the body which would interfere with entrance, by simply having the side of the seat as part of the door. To put it another way, the position of the door is nearer the back of the car, thus allowing the driver to enter through the center of the door instead of having available only a small part of the entrance space due to the position of the steering wheel.

Easy Steering Position

The *B* distance, which is measured horizontally from the edge of the steering wheel to the back of the front seat should be as large as is consistent with the lines of the car. It is not so vitally important as long as it is within certain figures which can very well be put as 13 and 18 in. With the *A* measurement correct, the driver will normally carry

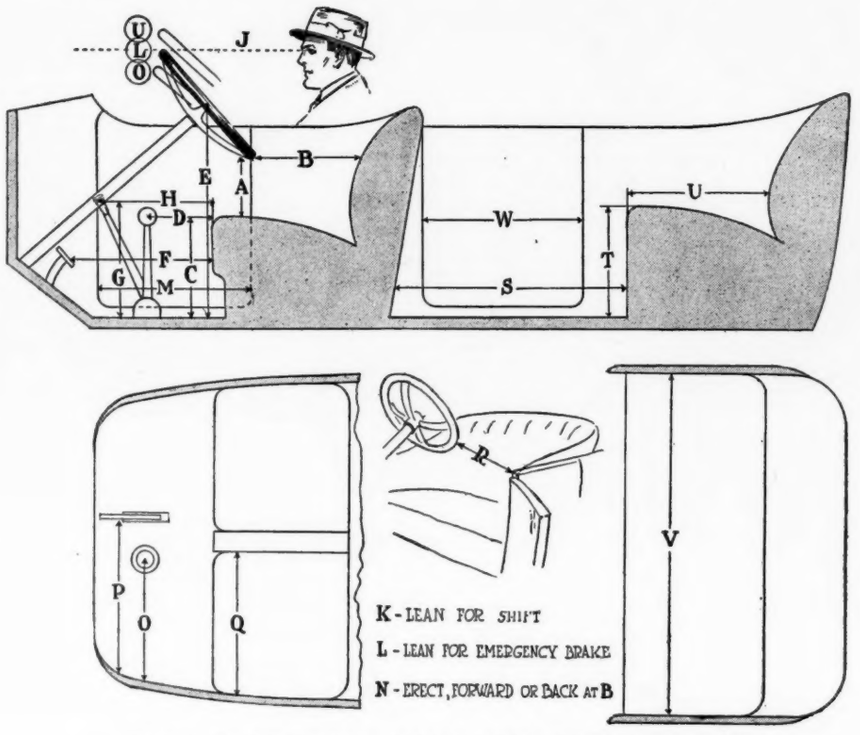


Diagram showing points at which tabulated dimensions were taken

Dimensions of Front Compartment on Typical Cars

Car No.	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	Remarks
1	9	19	13	7	26	20	10	15	L	No	Bad	21	E	16½	20½	15	9	Narrow—no room on left side.
2	9	16	12	14	27	19	16	14	Good	Yes	No	17	E	18	15½	16	10	Not enough leg room. Leg touches wheel.
3	8½	13	14	5	29	16	16½	14	0	No	Bad	19	E	19	22½	15	8	High but good.
4	8	13½	13	6	27	19	19	17	0	Good	Bad	20	E	19	22½	x	11	Fairly comfortable.
5	7	15	15	7	28	21	17	16	0	No	Very poor	16	Ex	16	19	21 Cont.	7	Seat too high and too erect.*
6	8	16	15	12	28	20½	17	20	x	Yes	Fair	21	Good	2½	3½	Cont.	11	Wheel interferes with vision. Windshield split also and in way.
7	7½	14	13½	5	26½	19	17	11	L 0	Left No	No.	19	E	18	20½	x	10	Seat too erect.
8	6	15	16	7	28	16	17	8	0	No	No	19	E	20	23	21 x	8	Wheel too close to seat.
9	7	14	15½	7½	27	19½	14	15	0	No	Yes	18	E	18	20½	20 Cont.	9	Fairly comfortable.
10	9	14	15	10	28	21	18	19	0	No	Bad	21	Fd.	20	23	Cont.	10	Back of seat too straight. Break down wheel good.
11	8	14	11	7	25	18	15	14	0	Good	Left	17	E	17	4	x	4	Bad left door. Practically useless. Poor leg room.
12	10	15	13	13	29	19	17	19	L	Yes	Yes	19	B	20	22	16 16	9½	Good.

Roadsters

13	7	16	13	9	26	20	15	16	0	No	Yes	19	E	17	20	Ct.	8	Good.
14	8	15	12½	12	27	20	15	14	0	Yes	No	21	E	18	15½	15	12	Easy entrance. Leg room short.
15	7½	18	13	6	26	18	16	12	U	Yes	Yes	23	B	19	16	17	15	Easy entrance. Look through wheel.
16	10	14	9	7	26	18	15	11	U	No	Yes	18	B	R	t.	C	5	Door useless. Look through wheel.
17	9	13	9	8	24	22	13	10	LU	No	No	20	B Good	19	22½	C	7	Comfortable. Bad entrance on left.
18	7	15	14	5	29	17	18	15	LU	No	Yes	19	B	19	23	18	8	Good leg room but bad entrance.
19	8	14	11	16	26	20	17	18	0	Yes	Yes	*	E	17	15	17	*	No room for left foot.

*Right door only.

Dimensions of Rear Compartment on Typical Cars

Car No.	S	T	U	V	W	Remarks
1	32	15	19	46	21	Comfortable, good back rest.
2	31	13½	18	45	25	Seat seems shallow due to excessive camber.
3	34	14	21	46	21	Good. Rear seat flat giving impression of width.
4	32	15	18	46	21	Back seat too erect.
5	27	14	18	42	17	Seat and back rest hard and stiff.
6	31	17	19	48	22	Good slope on rear seat with small but comfortable camber.
7	34	13	18	47	18	Seat seems shallow due to excessive bulge of back at too low a point.
8	24	15	22	45	21	Good. Deep seat with high back rest.
9	29	14½	21	46	20	Bad entrance. Door width is 20-in. but passage only 14 in. Seat too erect.
10	36	15½	19	48	20	Good. Soft back with springy upholstery.
11	26	15	20	40	20	Fine deep seat with correct back camber.
12	32	15	18	44	19	Very good. Sloping seat with high back. Could be improved by greater depth of seat.

Of what use is a door that cannot even open? Tire carriers on side

Position taken by driver too low in expensive special body

his hands at about the center of the wheel and with a correct *B* distance he will sit neither too uprightly nor will he recline too much.

The two distances *C* and *D*, that is seat height and reach to shifter lever, should be considered together as they are inter-related to a great degree as regards convenience in changing gears. In nine cars out of every ten, it is necessary to lean into a cramped position to change gears. To reach the change gear lever the driver ought not have to do more than lift his hand. The assembled car is the greatest offender in this detail as the upright shifter lever is allowed to fall where it will, because it is assembled on the coverplate of the unit powerplant gearset. A few considerate manufacturers have taken the trouble to bend the lever so that it is at the driver's hand whenever he wants to use it.

It means much to the life of the car if the gears are changed every time that occasion really demands, and the manufacturers are now endeavoring to educate the public to the use of the gearshift. One of the greatest educators in this respect is to put the gearshifter lever where it can be reached. A bend in the lever will not affect its manipulation in any way and will eliminate the burden of unhandy shifting and be a real asset to the car and driver as regards life of the former and the convenience of the latter. Therefore, the distance *D* should be short, about 6 in. being very good on a car where other details of design allow it. On cars measured, the distance amounted to as much as 14 in. which is double what the maximum should be.

The distance *E* measures the height of the steering wheel center above the floor of the car. It is only important when taken into consideration with the dimensions which govern the height of the driver's head above the floor. The letter *J* indicates whether the driver looks over, under or at the top rim of the steering wheel. The critical line is taken from the eye horizontally. In the tabulation the letter *L* signifies level, meaning that the eye and top of the wheel are on the same level, the letter *O*, means that the eye looks over the wheel and the letter *U* that the driver looks through the wheel.

Must Peer Through Wheel

There are a few people who like the racy appearance of the man who is lying almost flat on his back peering through the interstices of a steering wheel, the majority however, like to have a clear vision of the road and the surrounding country although without the feeling of height and prominence that is imparted by a seat on a municipal sprinkling cart. The happy medium is what is desired and if the line of sight from eye to top of radiator just clears the steering wheel, a very desirable effect is secured.

A very important dimension is denoted by *F*. It measures the distance horizontally from the center of the clutch pedal to the front seat wall. On some cars this distance is too short and the result is that when the leg is drawn back to place the foot upon the clutch pedal, the knee strikes the steering column or the upper part of the leg strikes the steering wheel. Actual sales have been lost because persons, with a slightly longer leg length than usual simply could not drive the car. The adjustable pedal which is increasing in use all the time is the necessary solution. The distance *F* should average about 19 in. with an adjustment of 3½ in. each way.

The height *G*, of the shifter lever is one of the factors which determines whether or not the driver will have to lean every time he makes a shift. It is very interesting to note the differences between the seat height *C*, and the shifter lever height *G*. In the car that had the best shifting arrangement of all those measured, the seat was 13 in. above the floor and the lever center 19, a difference of 6 in. This difference seemed about right to the observer who is of medium build. Other observers checked these claims and substantiated them. The remarks which cover the shifter lever also apply to the emergency lever, although for the latter it may be said it is hardly ever in use. It may be necessary some time to use both the emergency lever and the steering wheel at the same time. This would be almost impossible on a very large proportion of the cars.

In listing the cars that required a lean to make a shift, the symbol *K* is used. Under this heading the words Yes and No signify whether or not it is necessary to make a noticeable lean to shift gears. In many instances where the word No appears, although the driver did not have to bend his body excessively to make the change of gears, the arm had to be uncomfortably stretched. This gives the final check on the other dimensions governing the position of the driver in the seat.

Leaning to Shift Gears

Under the heading *L* will be found a list of cars in which an excessive lean was required to apply the emergency brake. This list is much less severe then it should have been because only very excessive leans are noted as Yes, and any car that allowed the driver to remain in his seated position was classed as No.

The divided seat cars skimp the driver's room in many instances. Where this skimping is felt is in the cramping of the left elbow space. With the high body now in use, it is impossible for the driver to rest his left elbow on the left gunwale without attaining a slouching posture due to a decided list of his body to starboard. A 15-in. seat is not wide enough to give elbow room unless there is a decided flare on the body. With the tendency now to have the body side straight, or even with a slight tumble home, the elbow room is sure to be poor unless the seat is 17 in. or more.

In some respects the divided front seat defeats its own object, unless great care is used in laying out the dimensions. The passage between the seats is supposed to be for the purpose of allowing a passenger to enter or leave the front compartment without stepping outside the car. It would be impossible for a lady clad in heavy garments to squeeze her way through on many of the cars using

the divided seat. In fact, many a man would prefer to walk around on the outside. The result is that not only has the driver's seat been cut down to an uncomfortable 15 in. but the object of the sacrifice has not been attained. The suggestion which has been carried out by some, of raising the floor between the two seats, does away with this objection.

Leg-Room in Cloverleaf Types

Speaking of divided front seats brings the cloverleaf roadster immediately to mind. One of the questions which the designers of some of these bodies have failed to ask themselves is, "What is the passenger in the rear seat going to do with that portion of his anatomy which is below his knees?" Sometimes a seat in the theater is very uncomfortable because the aisles are too narrow. Anyone long enough to have suffered through a 2 or 3-hr. performance in a narrow-aisle theater seat will not anxiously look forward to a 7-hr. drive in some of the cloverleaf roadsters, even if the suffering is mitigated to some extent by the privilege of whispering into the ear of the driver without leaving the seat. Knee-room must be allowed and this must be carefully watched in the four-passenger design especially, or the two rear passengers will leave the car as sworn enemies in spite of the efforts of the body builder to secure the effects of sociability or chumminess.

Entering the rear door of the 1916 car, one cannot help but be impressed by the lavish use of space. Perhaps the first thought will be one of wonderment as to what the passengers in the rear seat could possibly have against the driver, that they must be kept as far away from him as possible even if this distance is secured by pushing him close to the cowl board. The distance from the rear seat to the back of the front seat is measured by *S*, in the table. Even on the smaller cars this distance is 27 in. Compare this with 16 in. in the front compartment without even taking into consideration the deeper rear seat. Well may the driver cast his eye longingly behind him and wish that he had an inch or two of the surplus space!

The height *T*, of the rear seat does not vary greatly. On the other hand, the depth *U* varies materially. The seat depth dimension *U*, is quite important. An inch can be perceptibly felt and as long as there is so much room in the tonneau there is no use in sacrificing an inch or two of seat depth when it is really the key to comfort in many instances. If soft upholstery is used a marked camber can be successfully used on the back cushion and the result will be a comfortable seat. On the other hand if the seat is quite solid, it should be flat. An impression of depth is given by flatness. A good deep seat is often destroyed by having the bulge in the back rest too low. This pushes the occupant forward and destroys the effect of the deep seat. It is also the reason for the bolt upright position one is forced to take in so many of our cars whereas a slightly reclining position would be far more comfortable.

No criticism can be made on rear door width. There is plenty of that this year and this has been a most meritorious improvement. In fact in the entire tonneau design each year sees a marked advance in comfort and convenience. The only trouble is that some of this improvement is being secured at the expense of the front compartment and since the man that paid the money for the car is sitting in that compartment compressed between the steering wheel and the seat, it would be well to turn the tide in the other direction for a time.

Conveyor Saves Eleven Minutes Per Assembly

A GOOD illustration of modern speeding up is provided by the aerial conveyor system of the Studebaker Corp., which is used to carry bodies and wheels through the air from one building to another, a distance of 780 ft.

The conveying cables stretch from the third floor of one building to the fourth of another, and the object is to transport the bodies and wheels from manufacturing to assembly departments. Steel trestles support the cables, with the longest span 178 ft. At the terminals it was found necessary to install steel construction in the buildings from the ground up that the weight could be properly supported. The conveyor also crosses a steam railway track, and for safety against damage due to breakdown, a steel overhead bridge protects the cable-way here.

Variations in load are cared for by counterweights that take up any cable slack. The riding cable measures 1¼ in. diameter, and above it is the tow cable, operated by a 10-hp. electric motor.

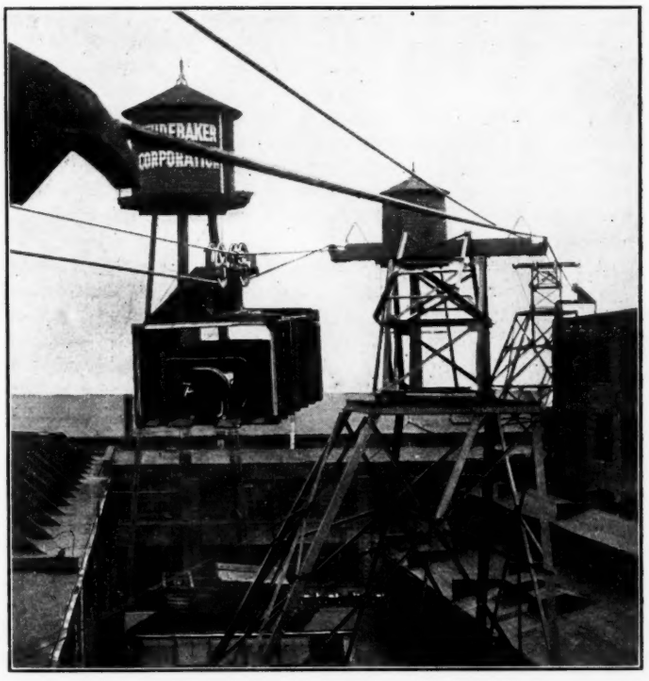
Twelve Times Quicker Than Trucking

Formerly the bodies and wheels were trucked to the assembling room. This necessitated their being taken down an elevator from the third floor of the finishing department, trucked through a tunnel to the assembly building and then another elevator was used to bring them to the fourth floor. On the average, 12 min. were required for the delivery of a body, with four men to handle it.

Now, two men at each terminus take care of the conveyor and do the loading and unloading. One man can draw a body either onto or off the conveyor car. The best record as yet attained in operating the conveyor has been the delivery of forty-one bodies in 42 min.

As traps catch and release the cable grips without requiring any attention, the operation is merely a matter of attending to the cargo. Wheels are carried in specially-constructed trucks, each made to hold fifteen wheels.

Needless to say the new conveyor scheme, which is only one of many of similar nature now installed in the factories of the concern, is effecting great savings and doing its part to cut down overhead expense.



New aerial conveyor system installed by the Studebaker Corp., Detroit, for the transfer of bodies and wheels from the finishing department to the assembly floor, a distance of 780 feet. Steel cables carry the load, and they are supported by trestles, with the longest span 178 feet

Enlarge French Automobile Factories

Demand for Increased Output of War Munitions Renders Expansion Necessary—All Plants Building Some Cars

By W. F. Bradley
Special Representative of The Automobile with the Allied Armies in France

PARIS, Oct. 15—If it were possible to find a stranger unacquainted with conditions in Europe and to take him on a tour of the automobile factory districts, he would come away with the conviction that the industry is in a most healthy condition. This conclusion would be based on the observation that at every automobile factory of importance building operations are in progress or nearing completion. It would be quicker for me to give a list of the automobile firms which have not, or are not, extending their works, than those having extended their ground area. No attempt will be made to prove that the allied armies have or have not attained their maximum power; but so far as the automobile industry is concerned the output of munitions of war is capable of further development.

Increase Outputs 50 to 100 Per Cent

The organization of the automobile industry of France as an auxiliary of the war department has been complete for a long time, but as the war has lengthened it has become possible to modify plants and extend factories so as to obtain increased outputs varying from 50 to 300 per cent. The machinery in any automobile factory is capable of shell production, but the best results can only be obtained by certain reorganizations and the expansion of certain departments. Until assurances were given that contracts for immense quantities would be placed, factory managements were not inclined to modify their plants and erect new buildings. These assurances have been given, and there are now automobile factories which might have been originally laid out for no other purpose than the production of war material. At the expenditure of considerable capital, plants have been modified so that shells are now produced under conditions which could not be improved upon by the best high-efficiency experts.

At the outset heat-treating and hardening departments were insufficient. Although the plant might be up to date for automobile work, it was not designed for big quantities of one particular type of shell. Some firms might be mentioned which have pulled down their old ovens, intended for various kinds of automobile parts, and replaced them by increased numbers of ovens designed exclusively for handling 75 mm. shells. Some of the smaller factories did not undertake their own hardening and were obliged to send their shells to outside specialists for treatment, with a consequent loss of time in handling and transhipment. In nearly every case this has been remedied.

Forging Plants Were Insufficient

When the automobile industry was taken over by the army there was a considerable shortage of forging plants. During the summer steam hammers were bringing fancy prices and not enough could be found to go round. Instead of shaping the shells under a steam hammer, all the leading factories now have special presses by which it is not only possible to make one-piece shells, but also to avoid all internal machining. Before it was possible to put down the new presses, important foundations had to be dug, in some cases new buildings had to be erected, and the ovens had to be increased in number to keep pace with the presses. In many cases it has been possible to increase output more than 200 per cent by this new plant. In the past it frequently happened that one particular department was so ill-equipped as to hold back the whole factory. As an instance, an automobile factory producing 1500 shells a day had but one machine for testing shells under hydraulic pressure—this pressure being practically 9 tons per sq. in. A lazy or inefficient operator, or a breakdown of this machine, was sufficient to hold back the entire output. These defects have been, or are being very largely remedied, with the result that the output is steadily on the increase, although the number of hands engaged has not appreciably altered.

Shells constitute about 60 per cent of the output of the French automobile factories. Conditions are very varied. In one automobile factory the only automobile parts were in the store room, and the door of this room was locked. In this case the factory had decided to specialize on shells to the exclusion of everything else, and after putting down die presses and erecting a hardening plant, is doing this work in a most efficient manner.

All Factories Building Some Cars

As a general rule, however, all factories are producing some cars, most of them being intended for the army. Although France has placed considerable orders in America, there do not appear to be many cases of touring cars bought abroad. The nearest approach to the touring car hailing from across the water is the Jeffery ¾-ton model, fitted with twin pneumatic tires on rear wheels. Several hundreds of these have gone into service with the ambulance formations. With this exception, all the touring cars for staff officers' use, all the light ambulances, and all the special cars for aviation, wireless telegraphy, searchlights, postal service, etc., are of French construction. The factories most busily occupied on this class of work are Renault, Panhard, Lorraine-Dietrich, Bayard-Clement, Unic, Delaunay-Belleville, Mors, De Dion-Bouton, Berliet and Delahaye. Although these firms are in a position to build cars in really important quantities, they are not supplying much to the public and are shipping next to nothing abroad.

Demand for Aviation Motors

During the last six months the automobile factories have been considerably interested in the production of aviation motors. As the Ministry of War has now allowed it to be announced, France has created since the war an immense fleet of aerial cruisers, both large and small, armed with quick-firing guns and cannons. Most of these aeroplanes have fixed cylinder, water-cooled motors of 150 to 250 hp. One of the biggest of the airships has four Renault twelve-cylinder motors of 250 hp. each, or 1000 hp. in all. The firms

which have been most interested in producing the new engines required for the aerial fleet are Renault, Lorraine-Dietrich, Peugeot, Hispano-Suiza, Darracq, De Dion-Bouton, Delaunay-Belleville, and of course the aviation motor firms Clerget, Gnome, and La Rhone. All the motors built by the automobile firms have six, eight or twelve water-cooled cylinders. While the aviation motor firms are continuing their rotary types, they have been obliged, under the call of the war department, to produce fixed cylinder water-cooled types. Clerget has brought out a six with piston valves, and Gnome, who formerly produced nothing but rotaries, is now making a nine fixed-cylinder water-cooled type and a double opposed eight, also with fixed cylinders.

Eight-Cylinder V a Success

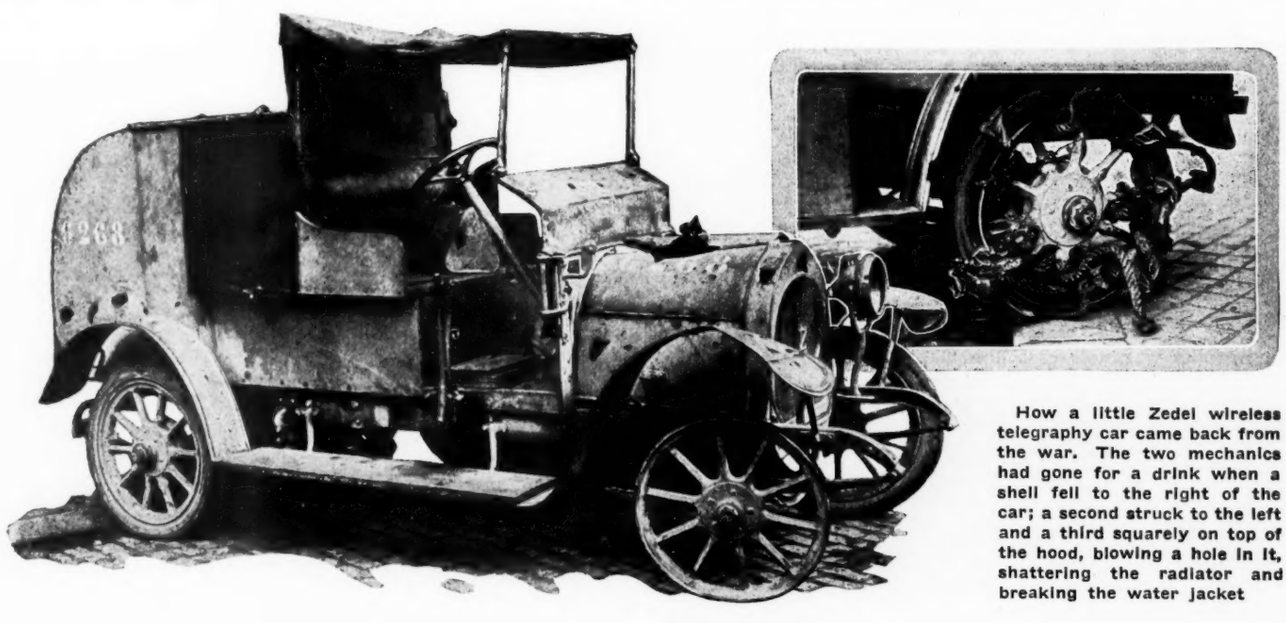
One of the most successful of the new aviation motors is an eight-cylinder V-type in aluminum with steel liners screwed into the cylinders. Each set of four cylinders forms a block. Cylinder heads are detachable and carry a pair of valves for each cylinder. An overhead camshaft operates each set of valves direct, there being no intermediate gear whatever. The nearest approach to the elimination of intermediate valve gear has been in the Peugeot racing motors, but on the aviation motor in question even this has been dispensed with, the cam being in direct contact with the valve stem. Another feature of the motor is the elimination of the base chamber as an oil reservoir. All the lubricant is contained in an oil radiator, pumped to the bearings, and then back to the radiator. This is a type of motor conforming to automobile design, and having a direct bearing on automobile production. Yet it has been possible to get the total weight as low as one kilogram (2.2 lb.) per horsepower and to reduce gasoline and oil consumption to 200 grams per horsepower-hour. The best featherweight rotary motors were far from giving such results. It is obvious to anybody who has been able to follow these developments that one outcome of the war will be the production by French manufacturers of six-, eight- and twelve-cylinder automobile engines of a weight hitherto undreamed of. Even though it is not desirable commercially to reduce weight to the low limits pertaining to aviation work, car engines will certainly weigh less after the war than before it.

Big Aviation Sixes

Delaunay-Belleville is producing big six-cylinder aviation motors under the direction of Charles Picker. Picker is a high-efficiency motor expert who before the war specialized in racing motors and produced such motors for various automobile firms. Darracq has secured the designs of the Isotta-Fraschini six-cylinder aviation motor and has laid plans for quantity production. Renault is turning out immense quantities of aeroplane motors, the line comprising his old eight-cylinder, air-cooled model, a six-cylinder, water-cooled, and a twin six, water-cooled. De Dion-Bouton is building an eight, water-cooled, Hispano-Suiza the same general type. Peugeot has made use of racing experience and is producing eights of the same general design as its racing fours. Engineer Henry, who did all the technical work on the Peugeot racing cars, has left his old firm and has obtained a contract for a quantity of eight-cylinder, water-cooled motors of the same design as those he built for the French races, and necessarily having much in common with the Peugeots. Bayard-Clement is interested in six-cylinder airship motors. All the new motors produced by these automobile firms have to undergo a thorough test at the government laboratories. Each engine must run without a stop for 10 to 15 hr., at full power, and attain a certain standard as regards horsepower-weight ratio, fuel consumption, etc. Charles Faroux, who will be remembered in connection with the 1913 race at Indianapolis, is one of the experts at the army laboratory.

Car Plants Help in Aeroplane Work

Not many automobile firms have taken up the production of army aeroplanes. Bayard-Clement is building both airships and aeroplanes, but did so before the war. Darracq has secured the license for the Vickers biplane and is producing Darracq-Vickers aeroplanes for the British army. In a short time this firm will produce aeroplanes complete with motors. There have been so many improvements and so many modifications of type of aeroplanes, that it has hardly been possible for automobile firms with no special experience in aeroplane construction to take up this work. All that the automobile factories can do is to take an accepted design and copy it in every detail. Obviously the aeroplane factories have had to increase their output enormously. In some cases streets have been closed to traffic and built over to provide additional shops, while other firms are obliged to leave their finished machines in the open air, under a military guard, owing to inability to get enough buildings to house them all while waiting delivery. The automobile body shops are able to give considerable help in aeroplane construction, but up to the present have not been called upon to any great extent. While the automobile factories are working at full pressure, the body shops have nothing more important to do than



How a little Zedel wireless telegraphy car came back from the war. The two mechanics had gone for a drink when a shell fell to the right of the car; a second struck to the left and a third squarely on top of the hood, blowing a hole in it, shattering the radiator and breaking the water jacket

Jeffery quad drawing a captured gun into Les Invalides, in Paris

produce ambulance bodies, field kitchens, etc. This class of work does not by any means compensate for their usual high-class business.

Army Takes All Trucks

Although the automobile industry of France is purely an accessory of the war department, it is possible to produce a certain number of cars for private use. These are mostly small cars not required for army purposes. As an instance, Renault is able to furnish a number of his twin-cylinder taxi-cab chassis which is used for light delivery work. It is absolutely impossible to buy a truck anywhere in France, for, although such firms as Saurer, De Dion-Bouton, Panhard, Bayard-Clement, Lorraine-Dietrich, Delahaye and Aries are producing in fairly large quantities, everything is taken up by the army. As every private truck has been requisitioned for army use, and is either in actual service or held in reserve, business firms find it a difficult matter to make deliveries of general goods. Marseilles, which has a very large trucking business, is one of the towns protesting at being deprived of automobile trucks. Even firms supplying the army have been deprived of their trucks and have to make deliveries by horses and various old types of vehicles.

Demand for Castings and Forgings

Firms endeavoring to produce cars are working under no ordinary difficulties. When the orders are for the army, government assistance is given in securing raw material, and requisitions will be made if material can be found not used for army purposes. The greatest demand is for iron and steel castings, stampings and forgings. One of the leading makers of drop forgings declared recently: "The only question automobile manufacturers ask now is, 'When can you make deliveries?' They never inquire about price; if we can make deliveries, they will foot the bill."

One manufacturer who is trying to do some private business declared that certain forgings for which he paid $16 before the war now cost him $36. Crankshafts for which he paid $23 before the war had gone up to $66. He had been able to place an order in America at $40, but his experience was that this firm did not work to the same fine limits as in Europe, and if there were any defects he would have to bear the loss.

There appears to be comparatively little difficulty in getting aluminum die castings, probably because these are not extensively produced in the invaded area. Steel and iron castings, stampings and forgings, all came from the Ardennes, the North of France and Belgium, all of which is country held by the Germans. Several thousands of dollars' worth of patterns are tied up in the invaded country. New patterns can be obtained readily, but the old patterns will not be available until after the war, if ever. One of the most important forges for automobile parts is the Arbel works, at Douai, which although within sight of the French lines is still in the hands of the enemy. Much ingenuity has had to be displayed in order to use material not usually considered suitable. One firm building a high-class car with axle housings machined from the solid forging found itself for a time unable to secure these forgings, and in consequence made use of a cast-steel housing with a steel tube liner. The same external experience was observed, so that the client was not aware his housing was not machined from the forging.

All automobile supplies have increased in price from 10 to 50 per cent. The fact that half-price has to be deposited with order and remainder on delivery is also an increased cost, for before the war 30 days credit was allowed. The effect of the war is felt in the accessory business, where there is an all around increase. Brass, bronze and iron castings, on which there has been a certain amount of machine work, have increased 40 per cent. Automobile factories have increased the price of spare parts by 30 to 40 per cent, although very few of these spares have been put into stock since the outbreak of war.

With only two or three exceptions, automobile factories are not military establishments, in the same sense as State arsenals, forts, docks, etc. At the same time they are practically all under military control. Broadly, there are three classes of workmen: men under direct military law, who have been ordered to return to the factories; men of the army reserve whom it has been considered desirable to leave at their ordinary employment; and those men who have been rejected as physically unfit or too old for active military service. To this latter class must be added a small number of neutral foreigners. Military inspectors visit the factories daily and exercise direct control over the two classes of military workmen. It is common practice for the inspector to enter and ask for some man whose name is on the military list. He insists on being taken to the place where the man is working; if that man cannot be found, or if he is discovered on private instead of military work, there is trouble in store for somebody. It is only possible to do non-military work with non-military workmen. Although the military men receive their usual pay, live at home and are apparently under the same conditions as in peace times, they are nevertheless subject to stringent supervision. They are not allowed to be absent from work; they are not allowed to change their employment; they are not allowed to work short time, and in many districts there are restrictions as to the sale of liquor to these men.

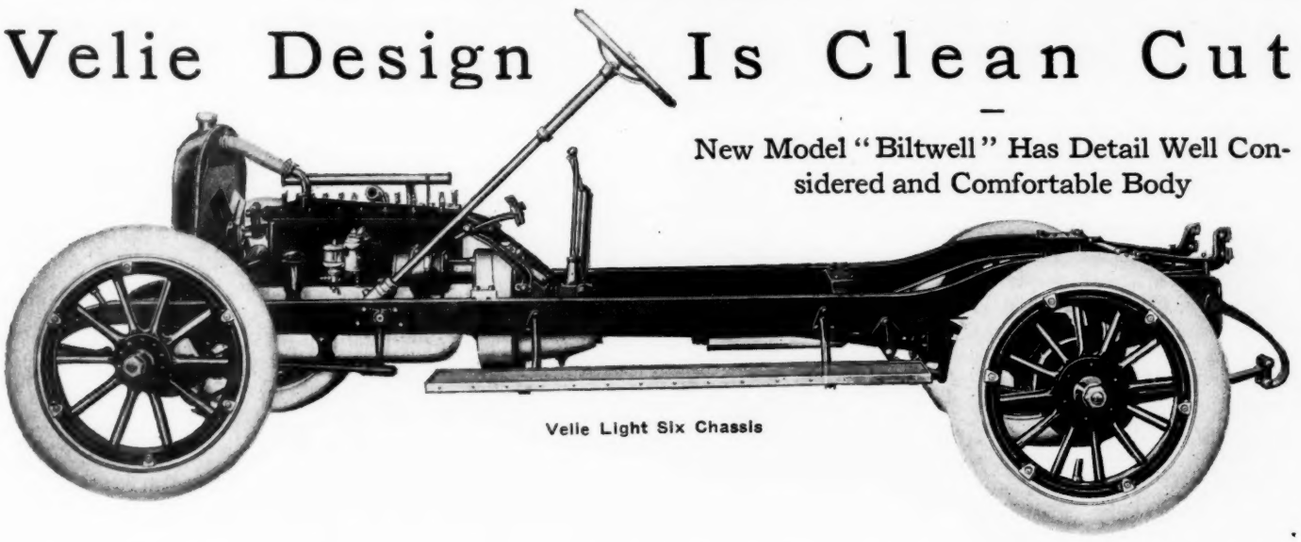
While the military laws cannot be applied to the non-military men, the general effect is to put the entire staff under the same moral obligations. Thus as the military workmen are practically obliged to work 11 hr. a day and six and one-half days per week, the others consider they are under an obligation to do as much. Short time is practically unknown. The strike spirit is entirely absent; if any attempt had to be made to foster a strike it would certainly be suppressed energetically.

Little Change in Tire Factories

There has been comparatively little change in the tire factories. The French factory of the Dunlop company which was closed for a number of months, has been reopened. Michelin is producing both solid and pneumatic tires and also parts of shells in the valve department. The Michelin firm is also interestd in the production of Breguet aeroplanes. The Goodrich factory is working on all kinds of tires, and is supplying both the army and civilians.

Velie Design Is Clean Cut

New Model "Biltwell" Has Detail Well Considered and Comfortable Body



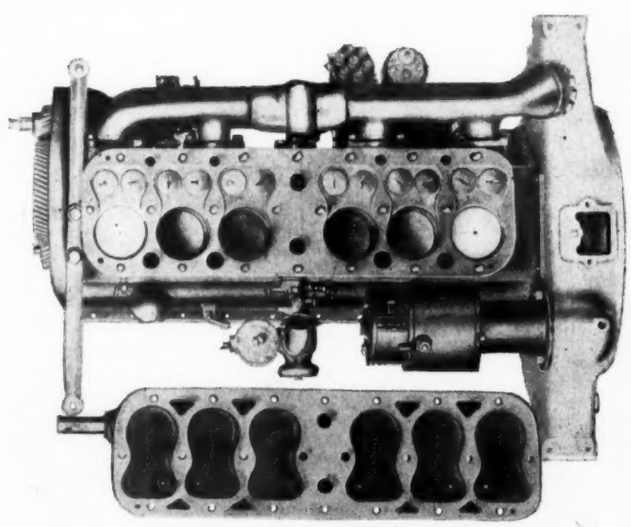
Velie Light Six Chassis

THE Velie Motor Vehicle Co., Moline, Ill., has produced a light six for 1916, selling for $1,065 with five-passenger body, and $1,045 as a roadster, the power plant being the Continental 3¼ by 4½ in. In the layout for the body, the comfort of driver and passengers has been studied, and many little details go to increase the convenience of the former individual. In the chassis, the aim has been to assemble good parts in a way which will enable each to show up to the best advantage, and the frame is designed to support the body at its edges, thus eliminating a certain amount of the ever-present possibility of body squeak after a few months of use.

Uses High-Speed Continental Motor

The engine is a type introduced by Continental last summer, and a sufficient number of the motors are now in use to have earned an excellent reputation. It is the first Continental engine to have the cylinders and upper half of the crankcase in one piece, with the exception of some small fours, and is certainly one of the best appearing jobs the big Detroit plant has ever turned out. The cylinder head is detachable, being held down by twenty-two studs, the nuts being all so accessible that they can be removed very quickly.

High crankshaft speed is aided by the comparatively short stroke, and by the large size of the valves, which are 1⅜ in. diameter in the clear and have a lift of ¼ in., this being sufficient to give a free flow of gas at speeds of 2000 r.p.m. and over. To guard against vibration the crankshaft is 1⅞ in. on the center bearing, the rear and front end bearings being 1/32 larger and 1/32 smaller respectively, to facilitate the reaming operation in assembling the motor for the first time.



Plan of Velie motor with head off

Everything that needs to be handled in a normal way is on the left side of the cylinder block, the carbureter, a Stromberg, bolting direct to the casting and having the oil filler cap close alongside. Just behind the steering gear box, where it is protected and yet easy to reach, is a junction box containing every electrical connection, so that lifting the left side of the hood uncovers everything likely to require inspection. The starting motor also is on this side of the engine, mounted high up where it is safe from inroads of water.

On the right side there is a Remy combined generator and ignition unit of the new, greatly neatened type, this being driven by a universal shaft from the water pump, through a flexible leather coupling. The generator is placed high enough to be accessible, and yet is sufficiently low not to interfere much with the accessibility of the valve stems, when the cover plates are removed. The new Remy generator and igniter has a vertical distributor shaft, or rather a shaft set at a slight angle to the vertical, so as to allow the high tension leads to be carried up well clear of the side of the motor so that interference from the exhaust manifold is prevented.

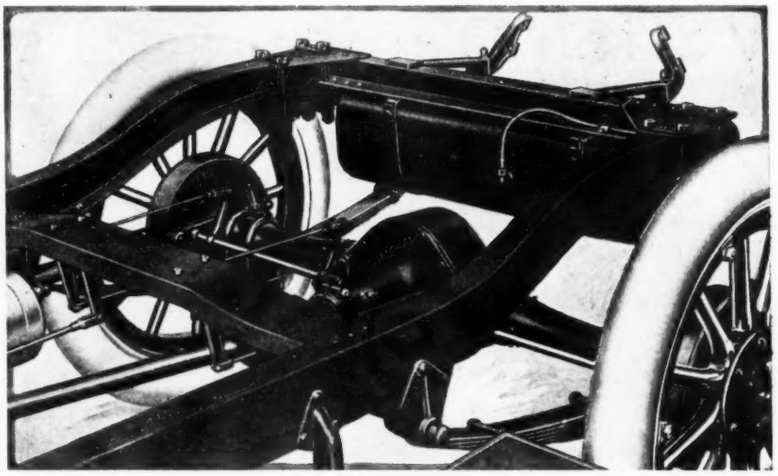
At the center of the manifold there is a very neat hot-air pocket, made integral with the main manifold casting, the hot-air pipe passing across the cylinders. In the plan view of the motor with the head removed it is easy to see how nicely the various fittings are disposed around it.

Lubrication is on the customary Continental system, there being a small plunger pump which is driven off a cam on the main camshaft. Oil is delivered to the main bearings of the crankshaft and to the timing gears; the large gear is a noiseless material, by the way, and there are also dip troughs for the connecting rods.

Clutch Adjustment Well Cared For

The clutch is a three-plate dry disk having two plates faced with Raybestos gripping a single disk of steel. Pressure from the spring is applied by a system of three levers, and the ball clutch thrust bearing receives its oil supply from the gearset lubricant automatically. Great care has been taken with the clutch adjustment so as to make it as simple and as effective as possible. Firstly, after removing the cover of the bell housing which incloses the clutch, it is only necessary to loosen two cap screws and revolve the toggle carrier in the desired direction and then, when the spring

tension is correct, the clutch pedal can be brought back to its original place by a slot adjustment at the foot of the lever. There is also an adjustment on the pedal plate itself and the purpose of providing a setting at both ends of the lever is to enable the pedal to be set to the very best advantage. The adjustment at the upper end is to allow the pedal to be put in the position best suited to the stature of the driver, and this adjustment is not intended to be used in connection with any alteration of the spring pressure, as the more delicate setting at the bottom end of the clutch pedal lever cares for this. Another point about the clutch is that the necessary grip is obtained with a light spring, a pressure of little over 30 lb. being necessary to disengage it.



Rear end of Velie chassis, showing brake balance gear

The three-speed gearbox is of that type in which the countershaft is fixed in the cast-iron outer case, and the countershaft gears revolve upon their shaft, being bushed for this purpose with phosphor bronze. Ball bearings are used upon the main shaft, and the gear ratios provided are 13 to 1 on low, 7.8 to 1 on middle gear and 4.25 to 1 on high. The gear shift is performed by a conventional rocking lever mounted on the gearset cover, but the upper end is brought to a position where it is conveniently within the driver's reach.

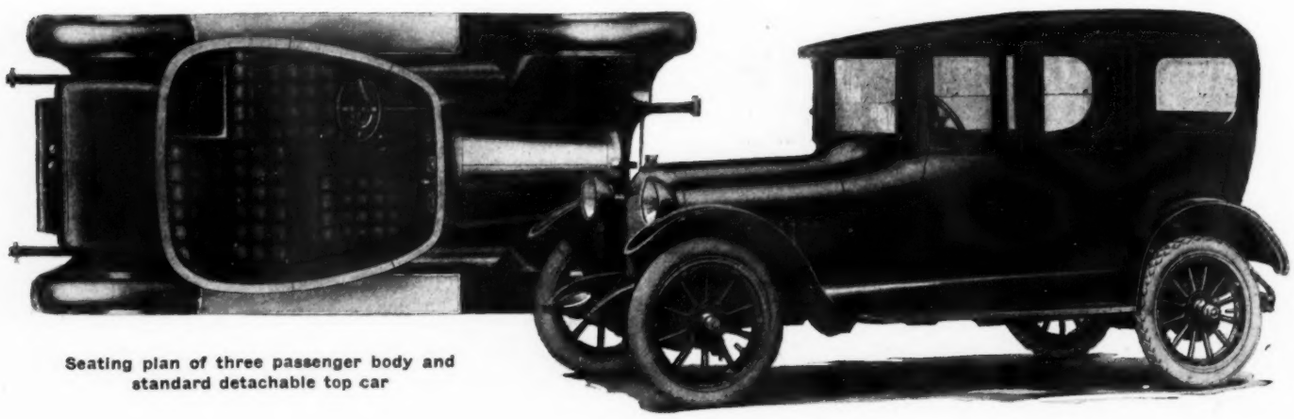
In the rear axle, which is a three-quarter floating Weston-Mott, spiral bevel gears are used, and Hyatt heavy duty roller bearings. Brakes are conventional, the service brake being external, and the bands have the quick-acting thumb nut adjustment introduced by Weston-Mott some months ago. There is a balance beam countershaft for the service and emergency brake, this being made in a unit assembly on a cross rail of the frame, and the pull rods are so arranged that all are straight. Precautions are taken to prevent rattle by attaching coil springs to steady the pull rods, and it is noteworthy that these little springs are stronger than usual and much more neatly applied. It is evident that they are a part of the design and not merely an afterthought.

It was mentioned that special pains were taken in laying out the frame. At first glance this appears to be a simple taper with straight sides wide apart at the rear and close together at the front end, but close examination shows that the frame reaches its full width at the point where the brackets at the front ends of the rear springs are attached. Thence, rearward from this point, the two side rails are parallel, the springs being carried directly beneath them, this removing all twisting stresses from the frame.

Being so wide, the frame is able to support the body in such a way that there is but little overhang at the sides, the floor of the tonneau being almost as wide as the rear seat itself, which has, by the way, ample room for its three passengers. The front compartment is distinctly a good one from the viewpoint of comfort, and the driver can get to his seat without a struggle through the left side door. A very neat radiator shell is used with a bulge in the face of the top water compartment, this giving the car a distinctive front view. Equipment includes double bulb lamps, and all the usual accessories, fuel feed being from a rear tank by Stewart vacuum system. There is a notable absence of points needing lubrication. Of course, the two universals need repacking with grease occasionally and the spring shackles have each their greaser, but the brake connections are mostly supplied with self-lubricating bushings and there are few other parts requiring individual attention. The wheelbase is 115 in., with tires 32 by 4 in.

An Interesting Special Body

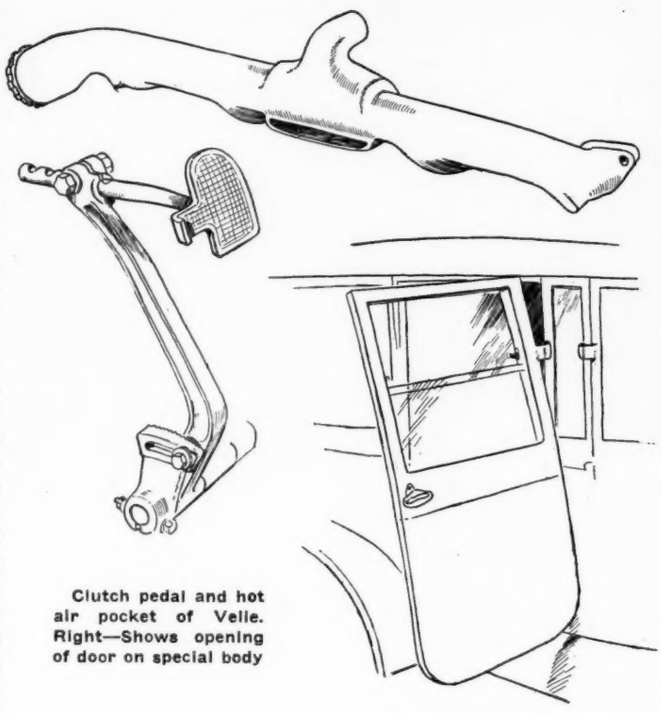
Though not a standard factory product, a special body at present in the New York dealer's showroom is worthy of mention, because it includes an extremely neat idea. It is a neat, demountable top design which suits the lines of the Velie touring body excellently, but its special feature is the manner in which the upper half of the door is held. It is well known that when the ordinary side door is opened it falls a little, and all sorts of sliding connections have been devised by detachable top makers to connect the upper and lower portions of the door and yet allow a gap to open between them, the lower half dropping its outer end as it opens and the upper half swinging square to the side. The makers of the special top hit on the happy idea of using a single hinge for the upper portion and putting the hinge pin at an angle, so that the top part of the door drops, when opened, just like the lower half. The two parts operate precisely like a solid door, and yet are more readily divisible than is usually the case with most similar types of body.



Seating plan of three passenger body and standard detachable top car

In addition to the standard bodies mentioned, the Velie Co. make a touring car with a detachable top, illustrated on the preceding page, and a comfortable car with seating for three passengers, which is likewise shown in the same illustration. These bodies have the same characteristic lines, and the detail in them is just as well cared for as in the other models.

Though they are not supplied as a standard fitting, the Velies that have been supplied with wire wheels disclose the fact that the latter suit the general lines of the car very well. A recently exhibited example of the five-passenger touring car was finished in the regulation dark blue, with a fine white line to outline the upper edge of the body, and white wire wheels. The appearance was extraordinarily smart, though it might be debated upon the score of lasting qualities, it being doubtful whether white is a really good color for wheel painting.



Clutch pedal and hot air pocket of Velie. Right—Shows opening of door on special body

A petty detail that has not so far been mentioned, and yet is characteristic of the care taken with the design as a whole, is the aluminum heel plate which supports the driver's right foot in convenient proximity to the throttle pedal. This accelerator pedal is situated well to the right of the brake pedal, where it can be reached when the leg is fairly well extended, this being thought to be a more comfortable location than the more customary position between the other two pedals, as in this case the leg must be bent a good deal. However, placed so high as it is, the accelerator pedal is only to be reached when the whole of the foot is upon the sloping part of the toe board and there would be a tendency for the foot to slide downward off the accelerator. To prevent this a neat casting of aluminum is attached to the toe board by a couple of screws, having a small curved rest for the heel of the shoe. In this the foot rests easily and the operation of the pedal is ideally easy. The screws that make the attachment can easily be taken out and the heel rest moved to whatever position best suits the driver's convenience in a matter of a few moments.

The Roamer—New Car of Striking Appearance

A NEW car of striking appearance slipped into the Chicago Automobile Show the middle of last week. It is the new Roamer which is being built by the Barley Mfg. Co., Streator, Ill., for the Thomas, Evarts Adams Co., importers of the Lancia car in New York. This company is to be the selling agent for New York and Boston and will also handle all export business on the machine. The Barley company also manufacture the Halladay car, and outside of the territory to be handled by the importers of the Lancia, the Roamer car will carry the name Halladay Special.

The car has been produced primarily with the idea of being marketed to that class of motorists which wants something distinctive in appearance and not too large. The radiator and hood design are copied from the Rolls-Royce and have the characteristic flat-sided appearance that has always helped to distinguish the well-known English product.

The car sells at $1,800, and outside of its somewhat different body lines and general exterior appearance, it is constructed of standard parts, such as Rutenber motor, Grant-Lees gearset, and Lavigne steering gear, Bijur starting and lighting, Bosch magneto ignition, and a Stromberg carbureter are among the important accessories.

In standard form the Roamer is equipped with Houk wire wheels, which add materially to the general appearance. The body is somewhat of the modified boat design with the widest point at about mid-center, and curving and rounding toward the back as well as the cowl. The front seats are individually divided and are almost in the armchair class. A slanting windshield and dome fenders do their part in promoting the good looks of the car. Any color and upholstering can be secured at the list price.

Among the main constructional features of the Roamer chassis are unit power plant, with the gearshift in the center and drive on the left, floating rear axle, a wheelbase of 122 in., three-quarter elliptic rear springs, and 34 by 4 tires. The motor, a standard Rutenber, block-cast, with 3⅛ by 5 dimensions is said to develop 46 hp. on the block.

Cooling is secured positively by a rather large pump, driven by shaft from the front gears. The Bosch magneto ignition is entirely separate from the starting and lighting system which is the Bijur two-unit design with the starting motor connecting by the Bendix shifting mechanism with teeth cut in the flywheel. Throwing on the starting current automatically meshes this Bendix transmission to give driving connection between starting motor and engine, and it is just as quick to release, once the engine is running under its own power.

In connection with the electric system a Willard 6-volt, 100-hr. battery is used, which is of such large capacity as to take care of the trying needs of the electric system adequately. Gasoline is supplied by a 15-gal. tank carried in the rear, from which the fuel is drawn to the carbureter by the Stewart vacuum system.

Throughout the chassis construction back of the motor, F. & S. ball bearings are fitted. The gearset is compact in form, and it as well as the multiple-disk clutch are well supported at the rear of the motor. Three speeds forward are supplied by the use of sturdy gears of 3½ per cent nickel steel.

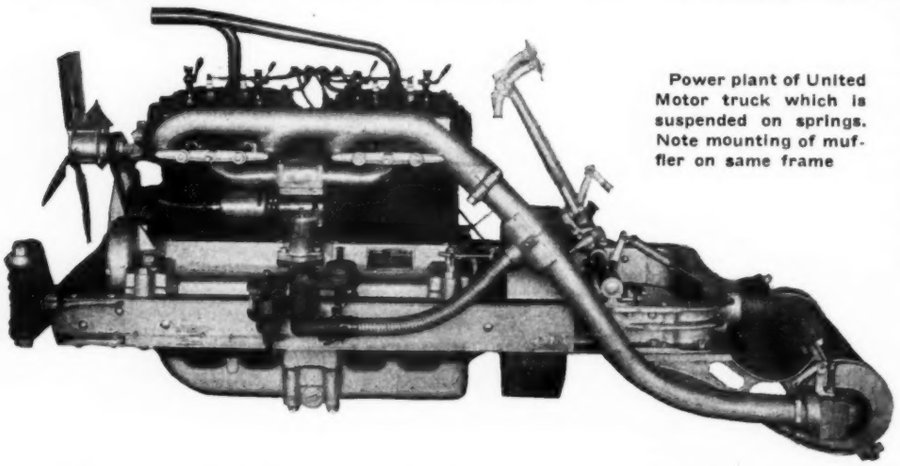
The drive from the motor unit to the rear axle is simplified by the employment of the Hotchkiss system of propulsion whereby both torque members and radius rods are eliminated by giving to the rear springs the added functions of drive and torque reception. The master leaf of each rear spring is made strong enough to do this efficiently, these leaves being 2 in. in width and almost flat.

New Trucks Show Progress

Some Late Models Announced in Past Few Months —Tractors Also Increasing Rapidly in Numbers

THREE new trucks have been brought out by the United States Motor Truck Co., Cincinnati. These are worm-driven models, which adhere to the design of the earlier chain-driven types in a great many ways. The capacities are 2, 3½ and 5 tons, with prices of $2,200, $2,850 and $3,600, respectively, which includes the chassis, driver's seat and standard equipment. The United States concern believes, as many other makers do, that the popularity of the worm-driven type of commercial vehicle is on the ascendancy, and, while it is the intention to make the chain-drive types as well, much attention has been and is to be put on the new models to meet varying conditions of service.

The engines used are of two sizes, of standard truck design. The 2-ton is fitted with a 4⅛ by 5¼, block-cast four-cylinder, L-head type, and the 3½ and 5-ton trucks have a 4½ by 5½ size, with cylinders in pairs. These rate at 27.25 hp. and 32.4 hp., respectively, and develop 40 and 47 hp. at 1500 r.p.m. They are made by Continental.



Power plant of United Motor truck which is suspended on springs. Note mounting of muffler on same frame

Other features include the Cotta type of gearset mounted amidships, this being a design in which the gears are always in mesh, with sliding clutches; Sheldon overhead-worm rear axle; semi-elliptic springs; and Hotchkiss type of drive through the springs.

Although not new to this make of truck, the method of mounting the motor and its allied accessories in a special subframe is none the less interesting. The motor itself is rigidly attached at four points to the subframe, but the latter is, in turn, carried in the main frame at three points to allow for frame weaving without putting any strain on the power unit.

The front end piece of the subframe has an arm extending out to the main frame, and the attachment is through a bracket riveted to the main member. Above and below this bracket is a coil spring that seats on the arm of the yoke end of the subframe member, a pin, running vertically through the yoke arms, the bracket and the coil springs, forming the union of the parts. Thus any vibration upward is taken by the lower coil, and downward vibration and weight through the upper. At the rear, a frame cross member cradles the center of the subframe in a 5-in. ball-and-socket support. This makes the rear of the engine free of the twisting movements of the frame, the front part being taken care of through the coil springs.

Frame Is Wood Filled

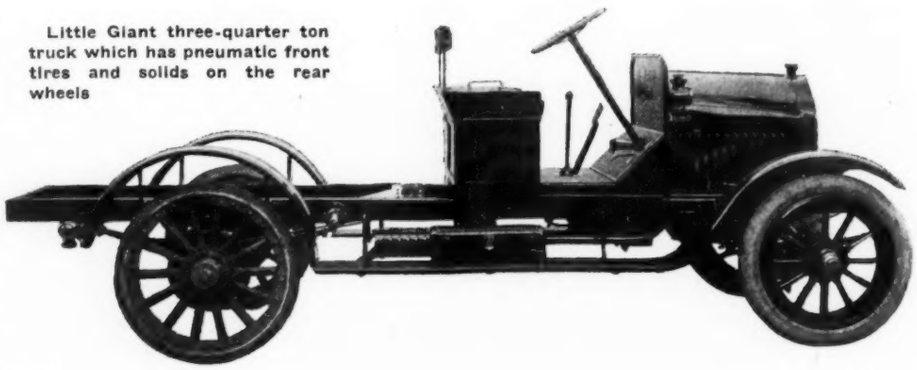
To further strengthen the subframe side rails, the channels are filled in with wood beams flush with the edges, affording a greater factor of safety against distortion at very little added cost or trouble in manufacture. Wood also plays a part in preventing overstraining of the subframe under severe motor twist either from dropping in the clutch suddenly or when the front wheel drops in a hole. Little hardwood bumpers are placed on the rear of the subframe and come in contact with the main frame when the twist gets beyond a certain limit, thus making the main frame assist in carrying the load.

The radiator is mounted in a steel cradle just inside the front frame member, suspended on springs to take care of vibration.

Another good feature which lends itself especially to assembly is the combining of the gasoline tank and control levers into one unit under the driving seat. That is, the brackets which support the tank also form the mountings of the levers and are put together before attachment to the truck frame.

Uses Hotchkiss Drive

The drive shaft between gearset and rear axle is of vanadium steel fitted with a universal at either end. These do not prevent it from being in correct line with the engine shaft except under frame distortion, however. Though unusual



Little Giant three-quarter ton truck which has pneumatic front tires and solids on the rear wheels

in truck service, the United States Co. is having great success with the Hotchkiss type of drive, which eliminates any radius rods or torsion arms. The second leaf of each half-elliptic rear spring is made strong enough to take drive and torque, and it is the one that attaches to the frame. The top leaf acts as a rebound absorber, and has a tendency to hold the main leaf against buckling.

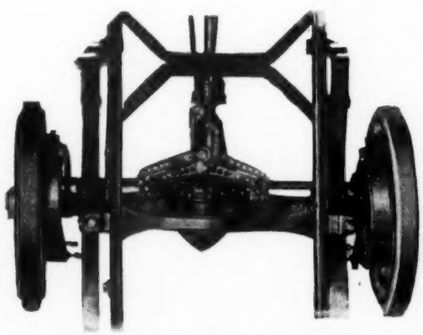
Sheldon supplies the over-head worm rear axles used on these trucks. These have substantial malleable housings, and the worm carrier bolts to the top, allowing for quick dismantling of the worm and wheel if necessary. There are also plates at front and rear of the worm carrier to give access to the adjustments of the bearings on either side of the worm. The design is such that there is a straight line drive when under rated load.

A clever method of equalizing the pull on the two brakes is employed. This is not new in these trucks, but it is worthy of special mention, in that a differential action is attained by the use of a bevel pinion and sector arrangement both on the service and emergency brake rods. A short cast-steel sleeve has an integral, toothed bevel sector. The sleeve carries the end of the shaft loosely, and is provided with a thrust arrangement. Keyed to the shaft is a second sector, so spaced as to match a bevel pinion which is carried on the upper portion of a lever that pivots loosely on the shaft between the sectors. This lever has the regular form of pull rod connection with the control up ahead, and on either end of the shaft assembly is a lever which connects to the brake on that side in the regular way. When force is applied to the brake, it acts upon the lever that carries the bevel pinion with sectors and shaft related, and this continues until resistance is effected by one or both brakes being engaged. But should resistance of one brake take place somewhat ahead of the other, motion through the bevel pinion is caused on the opposite sector until it is also engaged, when the differential movement ceases and equal force is applied to both brakes.

Three Menominee Models

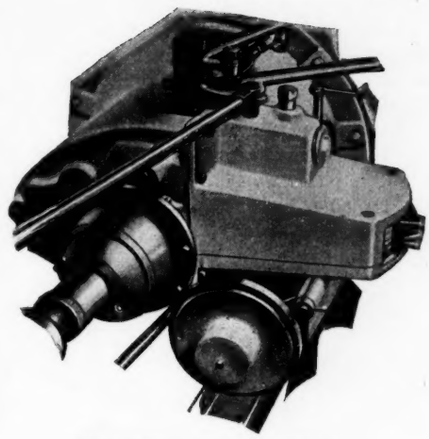
Several features not found in ordinary motor truck construction are prominent in the Menominee, made by the D. F. Poyer Co., Menominee, Mich. Three models, one at $1,125, one at $1,575 and one at $2,240, make up this line, one of 1500-lb. capacity using the spiral bevel drive and the other two, of 2000-lb. and 4000-lb. capacity, employing the worm drive. One of the features is a new type of radiator support, which also acts as a shock absorber. This is a pneumatic device, which, together with the tie rod at the top constitutes a three-point suspension and guards against road shocks, vibrations and warping stresses. This pneumatic rubber sphere offers a cushion and acts as a pivot, incased to protect it against dirt. The headlights also are carried on this shock-absorbing bracket.

Menominee trucks have auxiliary springs, coiled and fitted with special brackets and plunger guides. These springs come into action when the main springs are about to be overtaxed. In addition to this function, the auxiliary springs displace the ordinary rubber bumper and do not allow the load to come in dead contact with the rear axle.



Menominee brake balance gear

There is an automatic governor driven off the propeller shaft by a friction wheel in contact with the universal flange, acting on the intake manifold or through push rods.



Menominee governor drive

All three models have Continental motors, Stromberg carbureters and Bosch magnetos. The Model E has a four-cylinder, 3¾ by 5-in. power plant, the Model FW, 1-ton, a four-cylinder, 3¾ by 5¼-in. and the Model D, 2-ton, a four-cylinder, 4⅛ by 5¼-in. In all models the motor is under the hood. The smallest type uses thermo-syphon cooling and the other two have gear-driven, centrifugal pumps.

The clutch is a Brown-Lipe, multiple-disk, in all three models. The transmission also is Brown-Lipe with three speeds. Timken roller bearings are used on the main shaft and Standard ball bearings on the countershaft. The steering gear is Gemmer, worm and gear type, and the drive is on the left. The rear axle on the Model E is a Timken floating. On the other two models, the Timken-David Brown worm type of rear axle is used.

Uses Radius Rods

The Menominee truck line has another feature not mentioned in the earlier part of this story, it being a tubular type of distance rods designed to relieve the springs of driving stresses. These distance rods are set at an angle so as to maintain uniform distance between the gearset and the rear axle regardless of spring action. This is said practically to eliminate all sliding action of the propeller shafts in the universal. These rods act on swivel attachments on a frame bracket and are provided with adjustments, making it possible to maintain the axle in alignment at all times.

The gear ratio of the Model E is 5 1/13 to 1, the Model FW, 8¾ to 1, and the 2-ton, 9¼ to 1. Semi-elliptic springs both front and rear are found on all models in addition to the auxiliary springs already mentioned. When the emergency is applied the service brake automatically comes in service.

The maximum speed of the Model E is given as 25 m.p.h., of the Model FW, 16 m.p.h., and of the Model D, 14 m.p.h., all these being controlled by the automatic governor. The wheelbases for the Model E, FW, and D are 124, 144 and 144 in. respectively. Tires are solid rubber demountable or pressed on. 34 by 3½ single front and rear on the Model E, 36 by 3½ front and 36 by 5 rear single on the Model FW, and 36 by 4 single front and 36 by 6 single or 36 by 4 dual rear on the Model D. The chassis equipment includes driver's seat, running boards, headlights, Prest-O-Lite tank, two dashlights, tools, and two front and two rear fenders. Special bodies are furnished at various prices for the different types of trucks. The trucks will be painted any color desired without extra charge when ordered with bodies, although the standard colors are yellow running gear and red body.

Gary Is Worm Drive

The Gary Motor Truck Co., Gary, Ind., has in its worm-driven truck line, four models, the Model E, being of 1500-lb. capacity, the Model F, 1-ton; the Model G, 1½-ton and the Model H, 2-ton. All models use four-cylinder, Buda motors, the smaller model having a bore of 3½ in. and a stroke of 5⅛ in., the next, 3¾ by 5⅛, the 1½-ton, 3¾ by 5½, and the 2-ton, 4¼ by 5½. The crankcase is aluminum and the valves are inclosed.

The ignition on all models is by Eisemann magneto, while the carbureter is a new type Stromberg. Lubrication is accomplished by the constant-level, splash system together with a pump. The gearset is of the selective type, offering three speeds forward and one reverse. The clutch is a multiple disk, having facing of Raybestos and running dry. The steel disks are hardened saw steel and all pins are hardened, this construction being designed to eliminate wear as much as possible.

The company advocates the use of the semi-floating type of worm-drive rear axle as against the full-floating for the reason that there are but fourteen parts to the former, whereas the latter has twenty, and thus it is argued that the former is more simple.

Goodyear, type S. V. solid tires are used on all models of the Gary, the ¼-ton using 36 by 3 in front and 36 by 3½, rear; the 1-ton, 36 by 3½ in front and 36 by 4, rear; the 1½-ton, 36 by 3½ in front and 36 by 5, rear; the 2-ton, 36 by 4 in front and 36 by 6 in the rear.

Springs are semi-elliptic, both front and rear and the steering gear is of the worm and split nut type, equipped with an 18-in. wheel on all models. Equipment consists of side oil lamps, tail lamp, horn, jack and tools. Regular express or stake bodies are furnished, although special styles to meet individual requirements are built to order.

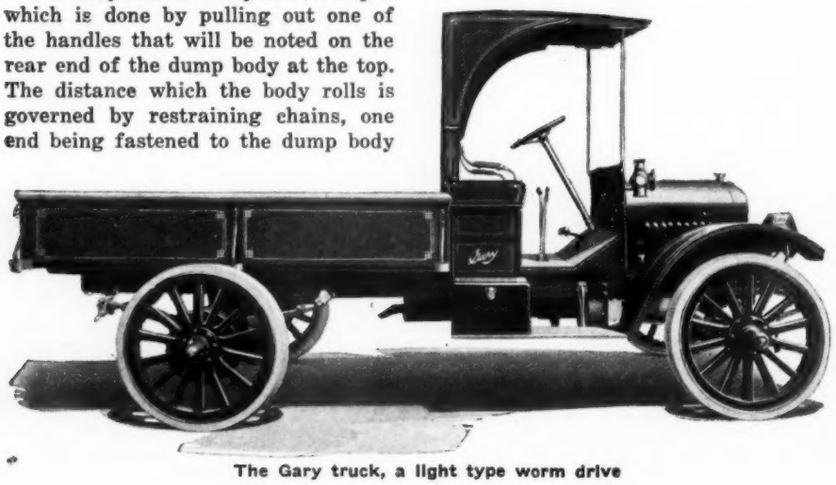
These trucks are guaranteed for one year, from the date of delivery to the purchaser, this guarantee being limited to making good, at the factory, any part or parts, that are defective. The company stipulates, however, that the guarantee ceases on any truck on which the governor seals have been broken.

Jeffery Has New Tip Body

The Thos. B. Jeffery Co., Kenosha, Wis. has recently brought out a new two-way side dump hand operated body, to be applied to the Jeffery Quads. The body is secured in position by two catches, one in the front and one in the rear, and an eccentric stop on each side; as well as by three rails on which it rolls in dumping. Each of these rails slopes away from the center line of the chassis to each side and terminates in a hook which acts as one of the final pivoting points when the body is being dumped.

In performing the dumping operation the handle which will be noted in the brace just over the right rear wheel in the illustration is raised, thus releasing the eccentric stop at the upper end of this brace. When the handle is raised clear up this brace may be moved outward which leaves the body free to turn. Next the handle noted in the rear of the body is moved, the action releasing a catch at the top of the inverted V brace, just above the handle, and a similar catch in front to which it is connected by a longitudinal rod.

The body now is ready to be dumped which is done by pulling out one of the handles that will be noted on the rear end of the dump body at the top. The distance which the body rolls is governed by restraining chains, one end being fastened to the dump body and the other to the bed of the truck. When empty, the dump body easily turns back into place.

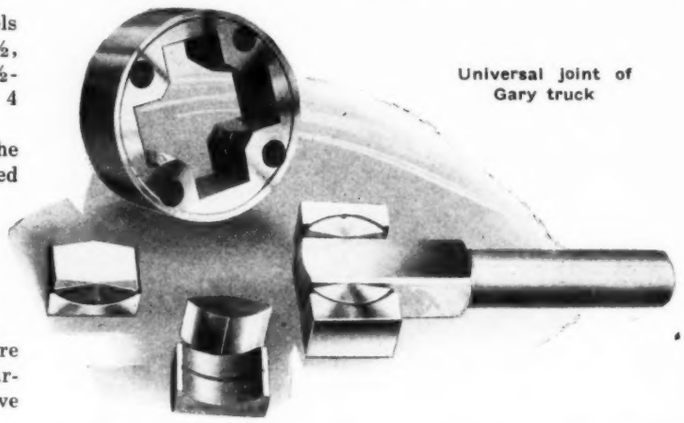


The Gary truck, a light type worm drive

In a series of tests at the Jeffery factory, it is said that an average driver could get down from his seat, dump the load, replace and secure the body and return to his seat in 30 sec.

Chase 1-Ton Worm Drive

The Chase Motor Truck Co., Syracuse, N. Y., has a new 1-ton worm-driven truck known as the model A and listing at $1,650, which employs a four-cylinder, L-head motor with a 3½-in. bore and a 5⅛-in. stroke. The carbureter is a Holley, and the ignition is by Bosch magneto. The gearset is a Brown-Lipe three speed, attached to the flywheel housing.



Universal joint of Gary truck

The clutch is a dry-plate and the drive is through a David Brown worm in connection with a Sheldon rear axle.

The steering gear is of the worm and nut type and the wheelbase is 140 in. Front tires are 36 by 3½ single, solid Firestones, and the rear 36 by 5 single-solid. Springs are semi-elliptic front and rear. The tread is 56 in., and the weight on the rear axle is said to be 53 per cent. The fuel tank holds 18 gal., and the oil tank 1¾ gal. The loading space back of the driver's seat is 8½ ft.

Speed is regulated by an automatic governor entirely inclosed and sealed. Electric lighting and starting equipment and rear fenders are furnished but are not included in the price of $1,650. Where the cab and seats are not wanted, a reduction of $40 is made from the list price.

Little Giant Line Includes Light Worm Model

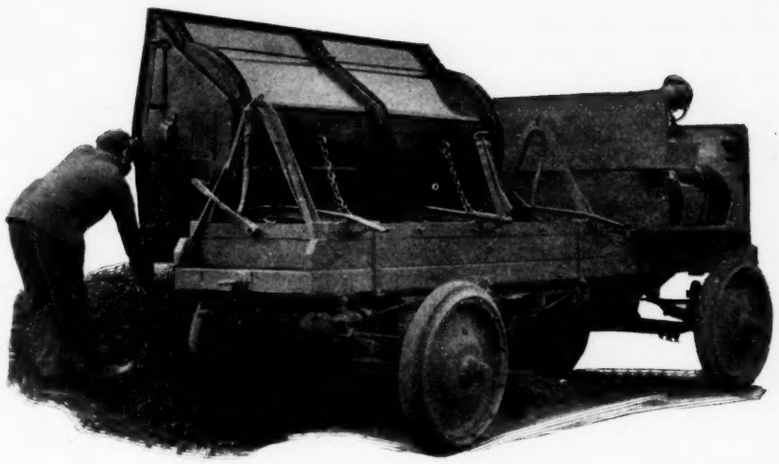
Another light truck with a worm rear axle is the Little Giant made by the Chicago Pneumatic Tool Co., Chicago. Two models, Nos. 15 and 16 of ¾- and 2-ton capacity respectively, have recently been added to the line, which also includes two chain driven models for loads of 1 ton and 1½ tons.

In general the chassis of the Little Giant is on conventional lines, the worm axles being Timken, with the Timken-David Brown worm. Both have Continental motors, the smaller 3½ by 5 in. and the larger 4⅛ by 5¼ in., each having Schebler carbureter, Eisemann magneto ignition and combination splash and force feed oiling, the pumps being of the plunger type driven from the camshaft. Speed is limited by governor to 15 m.p.h. on the large truck and 18½ on the smaller.

Special precautions have been taken to insure the strength of the frames, and the smaller details are all extremely robust in character.

On the smaller car the front tires are

pneumatic 34 by 4½ with single 34 by 3½ solid tires on the rear wheels, but the larger truck has 36 by 4 solid tires in front and dual 36 by 3½ at the rear. Equipment includes every necessary, the smaller car having a 50 amp.-hr. storage battery and lamps which can be used either with an electric bulb or with oil. The prices differ by $1,000 being $1,500 for the ¾-ton and $2,500 for the 2-ton.



Tip body on Jeffery Quad

Simplex Tractor Has Horizontal Motor

Designed to do the work of twelve horses, the Simplex tractor, made by the Simplex Tractor Co., Minneapolis, Minn., is equipped with a four-cylinder double opposed motor having cylinders with a bore of 5 in. and a stroke of 5 in. This motor is designed especially for tractor work developing 70 hp. at 750 r.p.m.

The master gear is of the internal type and is made in sections so that replacements are made easy if some of the teeth should become damaged. This gear attaches to and drives on the wheel rim. Self-lubricating steel pins are found in the master pinion, roller sleeves being substituted for the regulation teeth so that when the gears roll out of mesh friction is reduced. The intermediate gears are machine cut from solid steel and run in oil, which is also true of the transmission gears.

The transmission bearings are Hyatt rollers of the heavy duty type. A Kingston self-adjusting carbureter is used and also a Kingston magneto with impulse starter. Guiding is automatic when plowing, the right front wheel carrying a guiding rim which runs in the furrow and operates as a leader or guide.

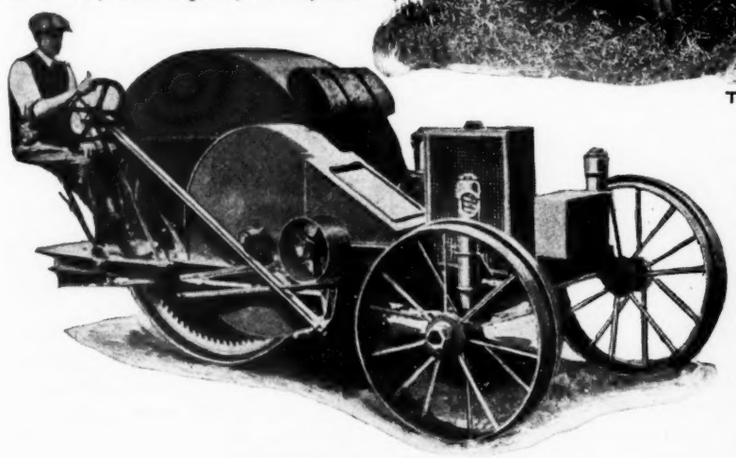
On low gear the Simplex has a speed of 1.66 m.p.h., on high 2.32, and on reverse the same as on low gear. The clutch is an expanding two-shoe type lined with asbestos. A cellular radiator together with a 20-in. fan and centrifugal pump furnishes the cooling. The wheelbase is 90 in., and the length over all 12 ft. The turning radius is 17 ft., the weight is 5500 lb., and the price completely equipped for traction or belt work $825. The belt pulley measures 9¾ in. face.

Nilson Tractor Pulls Four Plows

In the Nilson farm machine, made by the Nilson Farm Machine Co., Minneapolis, Minn., and listing at $1,485, f.o.b. the factory at Waukesha, Wis., one finds a tractor of unusual power, linked with light weight and flexibility. Control is simple, being like that of a truck. It is sold under a guarantee, covering the motor for one year, during which any part or parts of the motor that, under normal use, wear out or show defects will be replaced free of charge. The tractor is guaranteed, if maintained in proper order and operated by a thoroughly competent person, to pull four 14-in. breaking plows, 5 to 7 in. deep in sod or 7 to 9 in. deep in stubble soil; to haul a load of 7 to 8 tons on good roads; to operate a 30-in. separator and equipment, and other stationary equipment for farm work of a similar nature requiring equivalent power, such as seeders, drills, harrows, harvester and ensilage cutters.

A Waukesha motor is used, having a bore and stroke of 4¾ by 6¾ in., cooled by centrifugal pump, and Perfex radiator, together with a fan. The speed of the engine is regulated by a governor which is adjustable, self-lubricating and non-heating. The engine is rated at 50 to 55 hp. and gives a drawbar pull of 25 hp., while the belt power pull at 800 r.p.m. is 35 hp. The engine is fitted with a Kingston carbureter, although a special combination kerosene and gasoline carbureter is furnished at an extra price. Ignition is by magneto together with a K-W impulse starter.

The Nilson farm tractor

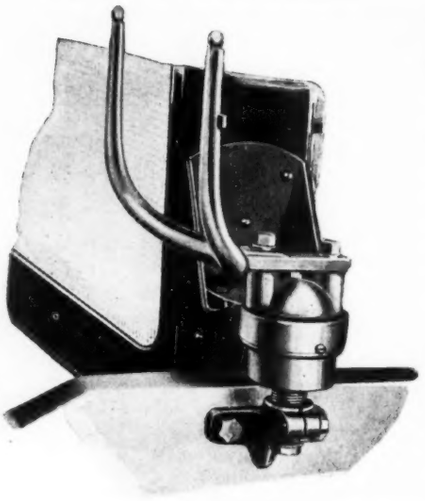


Simplex tractor costing $825

The gearset runs in oil, being incased in a heavy cast iron, oil- and dust-proof housing. Two speeds forward and one reverse are offered. The speed in low is approximately 2½ m.p.h. at 800 r.p.m. of the

motor, while the same motor speed gives 6 m.p.h. in high, although both the high and low speeds can be raised or lowered at the option of the driver. Adjustments are possible in the clutch transmission bearings and driving chains to take up wear.

The engine and gearset are each mounted separately on the frame by three-point suspension, and are connected by a universal. Power is delivered to the bull wheel through double chains. The front springs are semi-elliptic and the rear springs are coiled with a special adjustment and equalizing feature. The steering gear is of the worm and sector type and is in an oil-proof case. The weight is approximately 5200 lb. exclusive of extension wheels. These extension wheels just mentioned are 52 in. in diameter and 9 in. wide, and when not ordered included with the tractor a reduction in price is $47.50 for the wheels and $7.50 for one shaft pulley.

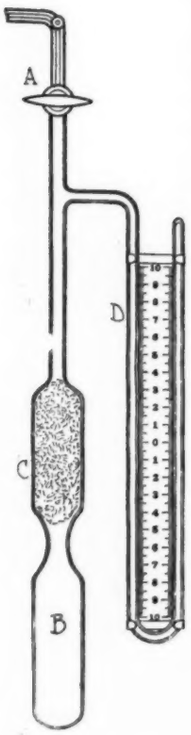


Menominee radiator mounting

The length over all is 13 ft. 9 in. The tread of the front wheels is 6 ft. 8 in. and the extreme width, 7 ft. 5 in. The height is 5 ft. 9 in., the wheelbase is 8 ft. 4 in., and the turning circle of radius 34 ft. The front wheels are 36 in. in diameter, and the traction or driving wheel 52 in. in diameter with a 23-in. base.

Inflammability of Gasoline Vapor

UNDER the file number of technical paper 115, Petroleum Technology 26, the Department of the Interior Bureau of Mines recently issued a booklet entitled Inflammability of Mixtures of Gasoline Vapor and Air, prepared by G. A. Burrell and H. T. Boyd. It presents some valuable data on safety and efficiency in the use of fuels dealing specifically with the inflammable limits of mixtures of gasoline vapor and air and also the method of determining the content of gasoline vapor in such mixtures. These matters are of particular importance in the internal combustion engine and also in ascertaining the risks involved in the storage and use of the volatile hydrocarbon.



The detailed methods of carrying out the experiments can be obtained by applying to the Bureau of Mines, Washington, D. C., for a copy of the bulletin. The general results arrived at are first, a definite method of determining the gasoline vapor in gaseous mixtures and secondly, the limits of inflammability.

The method of determining gasoline vapor in gaseous mixtures is as follows: An apparatus similar to that illustrated is employed. The bulb C contains phosphorous pentoxide for removing water vapor. If the latter were not removed it would also be retained at low temperatures and would subsequently exert pressure when measurement was being made of the pressure exerted by the gasoline vapor.

To start a determination the apparatus is connected to a vacuum pump and its air exhausted. The mixture of gasoline vapor and air is then introduced at atmospheric pressure, the barometer is read, and the two bulbs are immersed in liquid air contained in a Dewar flask. After about 10 min. the air is removed from the apparatus with a vacuum pump. The stopcock on the apparatus is then closed, the liquid air removed, the gasoline allowed to vaporize, and its pressure read on the mercury manometer attached to the apparatus. The ratio of this pressure to the pressure of the atmosphere gives the percentage of gasoline vapor originally in the air.

The tests for the range of explosion were made in a Hempel explosion pipette. Combustion was deemed complete when upon ignition of the mixture, flame filled the vessel as far as could be judged by eye. Measuring the percentage of gasoline vapor in the mixture it was found that no visible results were obtained until somewhere between 1.9 and 2 per cent gasoline vapor. At 1.9 per cent there was no visible result, at 2 per cent there was complete inflammation. Experiments showed that complete inflammation resulted up to as high as 6 per cent after which only incomplete inflammation resulted.

Another set of experiments brought the figure at the lower limit down to 1.5 per cent gasoline vapor. This was for gasoline of 73 deg. Baume. A new set of experiments was made to determine if the low limit for 73 gasoline was different from that of what is known as cleaners' naptha which has a Baume rating of 59 or 60. It was found that complete inflammation started between 1.4 and 1.5 per cent gasoline vapor. Roughly, it may be stated therefore, that a mixture is explosive between the ranges of 1.4 and 6.4 per cent gasoline vapor as far as complete combustion is concerned.

Suit on Fire Policies

In Massachusetts it was recently decided that misdescriptions in applications for fire insurance on automobiles do not necessarily void the policies. Two actions were tried together on three polices of insurance. One policy had been issued in the sum of $1,500 by the Royal Insurance Co. on a Fiat automobile, and the other two had been issued in the sums of $1,800 and $650 respectively, on two Hotchkiss cars by the Columbian Insurance Co.

After the issuance of the policies all three cars were destroyed by fire. When the losses were not paid, suit was brought on the policies and the companies alleged that there had been a misdescription in the year model of the cars in the applications for the policies, though they conceded that the descriptions had been correct as regards the factory numbers of the cars, the types of body, the number of cylinders, the horsepower, etc.

The insurance companies further said that the Fiat car was a 1907 model, and the Hotchkiss cars were 1906 models. An expert who was put on the stand as a witness testified that the cars were all 1908 models; but that did not mean necessarily that they had been manufactured in 1908, as foreign manufacturers did not make yearly models as American manufacturers were accustomed to do, and at that time European cars were designated as 1905-1906, 1906-1907 models of each make.

The court decided therefore that the contract had taken effect, and as neither of the companies had been in the habit of charging greater premiums for 1907 cars than they did for 1908 cars the misdescription was immaterial and the insured was allowed to recover on the policies.—*Locke vs. Royal Ins. Co. and Locke vs. Columbian Ins. Co.*, 107 *Northeastern* (*Massachusetts*) 911.

Trying Direct Fuel Spray

A French Attempt to Use Kerosene By Spraying Into the Cylinders Proved Promising

By W. F. Bradley

SHORTLY before the war some very interesting experiments were carried out in France on a Bellem and Bregeras kerosene or crude oil motor, adapted to a passenger car. This motor has been in use for a certain time in France for big stationary and boat motors. One of the leading French engineering firms has adopted it for kerosene motors to be used as auxiliaries aboard French battleships; it is strictly forbidden to have any gasoline aboard these ships. Certain features of the invention appeared to be prejudicial to the adoption of this motor to private cars and commercial vehicles. The inventor recognized this and modified his design in consequence. For demonstration purposes he converted a Ford motor to his system and ran it on kerosene, starting from cold with no more difficulty than with gasoline. The experiments are one day to be continued with crude oil as fuel, no change whatever being made in the mechanism. To burn crude oil the motor must first be started on kerosene, and as soon as warmed up the crude oil turned on.

Spray Caused by Vacuum

The essential feature of the Bellem system is the spraying of fuel into the cylinder when a partial vacuum has been formed. For this purpose the intake valve is held down during a considerable portion of the induction stroke. During this time the fuel is very finely sprayed into the cylinder, a very small quantity of air being admitted at the same time. By reason of the partial vacuum the fuel is completely vaporized, the cold mist thus formed being as fine as the vapors obtained by heating kerosene. When the mixture is formed, it is diluted with pure air through the ordinary intake valve of the motor. This valve has a rapid opening and does not close until 45 deg. after lower dead center. Compression, firing and exhaust strokes are the same as on any ordinary four-cycle motor.

In the conversion, the Ford was fitted with a new camshaft, on which the intake cams provided for an opening 45 deg. before lower dead center and a closing 45 deg. after lower dead center. The exhaust cam was not changed. A vaporizer valve was mounted in the head of each cylinder by the side of the spark plug. In place of the carbureter, which was completely discarded, there was a metal box about the size of a magneto, within which an eccentric shaft drove the four pump plungers. This shaft operated at half engine speed by means of a chain from the front end of the crankshaft to a countershaft mounted in brackets from the frame member, and by a short chain from the countershaft. Connected up to the intake ports was a pure air manifold. This is nothing more than a brass tube with its ends closed, having a number of slots cut on its circumference. There was a sleeve within the tube capable of a sufficient movement completely to cover or uncover the intake ports, thus varying the amount of air admitted to the cylinders.

The action of the injector is as follows: the pulverizer valve is automatic in action, the fuel arriving through *E*, Fig. 1. On the valve being opened by aspiration, *A* is uncovered, and fuel is sprayed through *B* and *C*. On leaving *C*, it comes in contact with the air, having passed down the valve stem and entered the combustion chamber by *D*. The quantity of fuel sprayed is definitely determined by the pump, and is controllable while the motor is in operation by means of a lever brought up to the steering wheel.

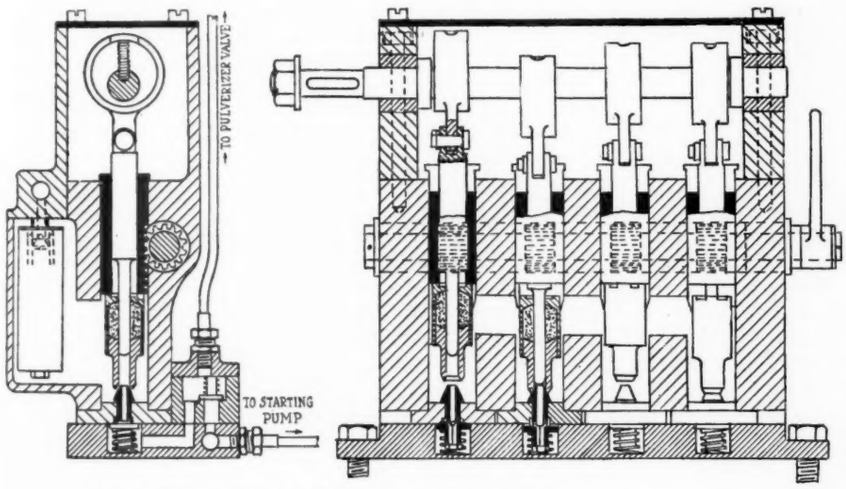


Fig. 2—Fuel pumps of Bellem and Bregeras motor

Control Is Effective

The ability to vary the quantity of fuel while the motor is in motion is the most important feature of the pump. The latest type of pump tried is shown in Fig. 2. A constant level is maintained by the usual expedient of a float. The piston, operated by an eccentric, has a prolongation which forms the plunger and passes into the pump cylinder through a stuffing box composed of compressed cork. This material was found to give excellent service. The end

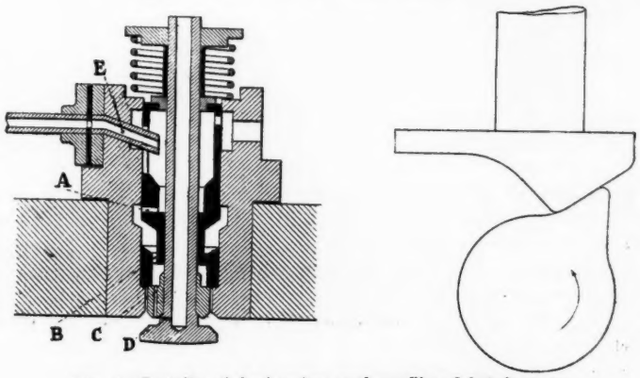
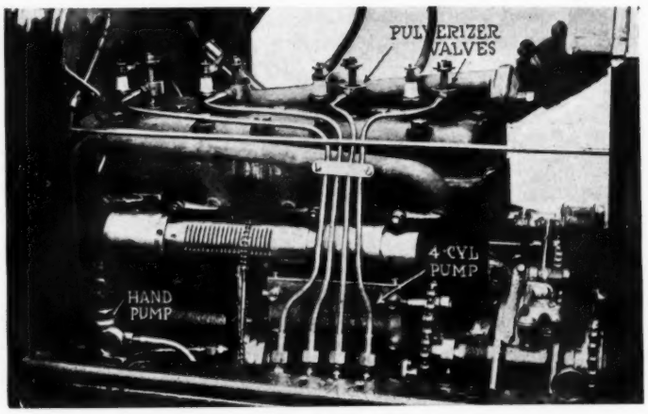


Fig. 1—Details of fuel valve and profile of intake cam

of the pump cylinder is conical and abuts against the pump cylinder. It will be seen that the guide can be moved up and down by means of a rack and pinion arrangement, the control for this being brought up to the steering wheel and taking the place of the usual throttle lever.

If the guide is raised by the operation of the steering wheel lever, a certain amount of space will be obtained between the bottom of the guide and the top of the stuffing box. On the upstroke of the plunger, the pump cylinder will first of all be carried along with it by reason of the adhesion of the cork. When the stuffing box abuts against the bottom of the guide, its movement is arrested and during the remainder of the stroke the plunger is moving alone, and drawing in fuel.

It is possible to raise the guide until the play between its extremity and the top of the stuffing box is equal to the stroke of the piston, in which case the cylinder moves up and down with the piston without drawing in or driving out any fuel. Very fine adjustment is obtainable between the guide and the stuffing box, thus giving very minute variations in the amount of fuel fed to the pulverizer valve. On the downstroke of the piston the conical joint is closed and the fuel is forced through the check valve to the pulverizer valve.



Ford motor converted to kerosene system

For starting up there is a small hand pump with control brought through the radiator, as in the case of a carbureter tickler. This allows fuel to be delivered direct to the pulverizer valves.

S. A. E. Appoints New Chairman of Standards Committee

AT the meeting of Council held in Chicago, Jan. 28, A. Ludlow Clayden (Engineering editor of THE AUTOMOBILE) was appointed chairman of the standards committee of the society. Mr. Clayden has been chairman of the foreign cooperation division of the standards committee since its creation early last year.

The resignation of Mr. K. W. Zimmerschied, who has been a most active and able chairman of the standards committee for the past year, was accepted with the deepest regret. Mr. Zimmerschied found that his work as metallurgical expert to the General Motors Co. was growing to such an extent that he could not give the time necessary to the increasing activities of the standardization work.

A. Ludlow Clayden

There is no member of the society who will not regret Mr. Zimmerschied's inability to continue the work which he has handled in so masterly a way; proving a very worthy successor to Henry Souther who was the first chairman of the standards committee, and largely the creator of the standards idea.

Mr. Clayden, who now succeeds Mr. Zimmerschied, was born in England in 1883. His training from the earliest commencement of his education was scientific and mechanical, being completed in the engineering department of Bristol University, England. His business existence commenced in garage and repair work, followed by several factory appointments in Coventry where he gained experience in the early development of both passenger cars and commercial vehicles.

In 1908 he turned to automobile journalism, joining the staff of the publishers of the principal British trade papers, notably *The Autocar*, and two years later founded *The Automobile Engineer*.

In 1911 he made his first visit to this country, and took part in the S. A. E. convention at Dayton, Ohio, that summer, being so impressed with what he heard there and, subsequently, saw in the manufacturing centers, that he set about to organize the visit which representatives of the British Institution of Automobile Engineers paid to the S. A. E. in 1913.

In 1914 he returned to America, and shortly afterwards became connected with the Class Journal Co. in the position which he now holds. He has read several papers before the society, of which he has been a member for six years.

Gasoline High in England

In commenting upon the price of gasoline *The Motor* (England) accuses distillers and importers alike of playing a game entirely to their own ends. In a recent editorial their opinion was expressed as follows:

"We understand that the big importers of motor spirit—other than one company which has not adopted the most recent and otherwise concerted advance of 2 cents per gallon—consider that they have been obliged, by force of circumstances, to follow the course which they have taken. It is represented to us, for example, on behalf of these acting-in-concert importers, that government demands have of late grown to such huge dimensions that it has become almost a matter of kind-heartedness on their part for them to keep up supplies to private car owners, to say nothing of prices.

"We are well aware that the demands of the Mechanical transport columns and units of the army service corps (inclusive of the motor ambulance branch) account for a monthly demand which, while a fluctuating one, is at all times large. We have reason to attach still greater importance to the volume of the demand by the admiralty in connection with the motor-boat patrol.

"We do not see eye-to-eye with price apologists concerning the high rates of freights which rule. It seems to us that the importers of motor spirit are also 'in clover' here, seeing that the freights are to a great extent merely paid out of one pocket into another, having regard to the community of interest which exists in the case of each of the two largest importing companies, between their motor spirit branches and their shipping branches. The net profits promise to be thoroughly well maintained."

The Rostrum

Short Circuit in Ignition Wiring

EDITOR THE AUTOMOBILE:—I have a model 42, 1915 Oldsmobile and at times, turning on the lights stops the engine. Then again, it will be running along all right and the engine stops. Other times, it will run all right for days. I have examined all the wiring and can find nothing loose or dirty or short-circuited. I had the Stewart vacuum gasoline system put on the car and thought perhaps when the engine stopped it was not feeding properly, but on examination, found plenty of gasoline. What do you think is the cause for this and can you give me a remedy?

2—How can I properly install an ammeter on this car?

South Bend, Ind. L. C. M.

—This trouble may either be caused by a poor connection on the ignition system or by a swinging ground somewhere on the circuit that causes the circuit-breaker to trip. It is suggested that you inspect the system and see if the lights go out when the ignition stops. You can test this by trying it on the battery ignition with the lights on.

It is possible that there might be a broken valve spring in the valve leading to the intake manifold on the vacuum system. If this valve spring were broken, occasionally a supply of raw gas would be drawn directly into the intake manifold. This would kill the motor although the gasoline supply in the carbureter would not be seriously affected by the broken spring.

2—In installing an ammeter on this car the instrument should be mounted at a convenient place on the dash and the wire running from the No. 1 post on the switch should be cut and the cut ends of the wire connected to each of the connecting posts on the ammeter.

Connecting Ammeter on 1914 Richmond

Editor THE AUTOMOBILE:—Please give me a drawing for connecting an ammeter to a 1914 Richmond car with Kingston electrical equipment.

Baltic, Ohio. P. S. G.

—The method of attaching an ammeter on a 1914 Richmond car with Kingston equipment is given in Fig. 1. The sketch shows the ammeter connected on the ignition wiring only. It would be operative only when the engine was running on the dry cells and would show the amount of current being drawn from the cells. Fig. 1 also shows a wiring diagram of the Jesco starting and lighting system made by the Jones Electric Starter Co., Chicago, Ill. It is this system which is used for the lighting and starting while the Kingston system is used for ignition. On this system the proper place to put the ammeter would be between the generator and the storage battery, as indicated.

Who Invented the Cord Tire?

Editor THE AUTOMOBILE:—In your article in the November 25 issue of THE AUTOMOBILE on the tire industry and its development in the United States, you make the statement that the Silvertown cord tire is the invention of John Palmer. This is incorrect as it was invented by Thomas Sloper, an Englishman, and the erroneous impression that it is John Palmer's invention springs, no doubt, from the fact that the company in London, England, with whom Mr. Sloper is connected, is known as the Palmer Tyre Co. This concern, although it derived its name, in the early days of the pedal bicycle, from the Palmer cycle tire fabric, owes nothing to John Palmer for the invention and development of the automobile tire made and sold in England and other European countries and known as the Palmer cord tyre which is the parent of the Goodrich Silvertown cord tire now so famous in the United States. That distinction belongs entirely to Thomas Sloper and I think it is due to him that the correction be made.

Akron, Ohio. A. E. C.

—A copy of this letter was submitted to John Palmer who replied as follows:

Editor THE AUTOMOBILE:—I have yours of the 10th inst. and welcome the opportunity for publishing a clear statement of the invention and development of the so-called cord tires, using the phrase as marking in the public mind a type of pneumatic tire in which the carcass consists of two or more independent unconnected layers of cord, insulated from each other by rubber with alternate layers laid at opposing angles without interweaving or other bond as between the two layers and with no consideration given to methods of attaching this structure to the wheel, to processes of manufacture or machinery therefor.

This is the tire as invented by me in 1892, patented in the United States and England in 1893. These English patents

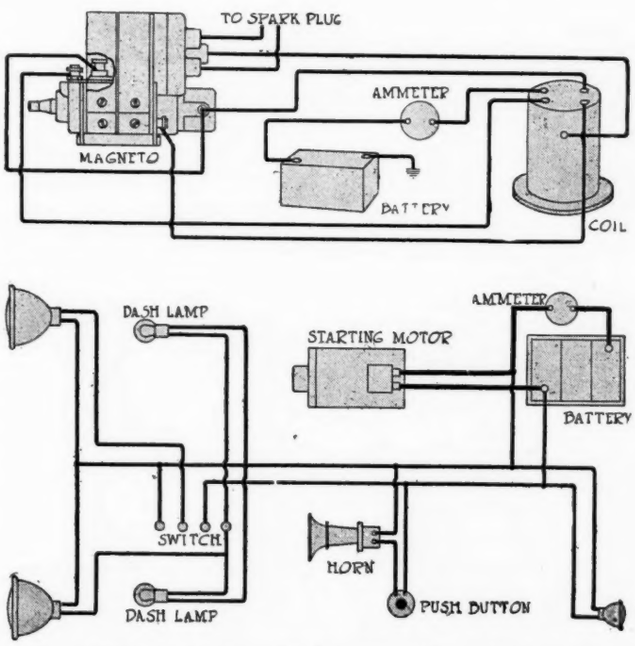


Fig. 1—Wiring diagrams showing connections of ammeters on circuits of the 1914 Richmond. This car has two independent sets of wiring, the Kingston system being used for ignition and the Jesco system for lighting and starting. The upper diagram is for ignition and the lower for lighting and starting

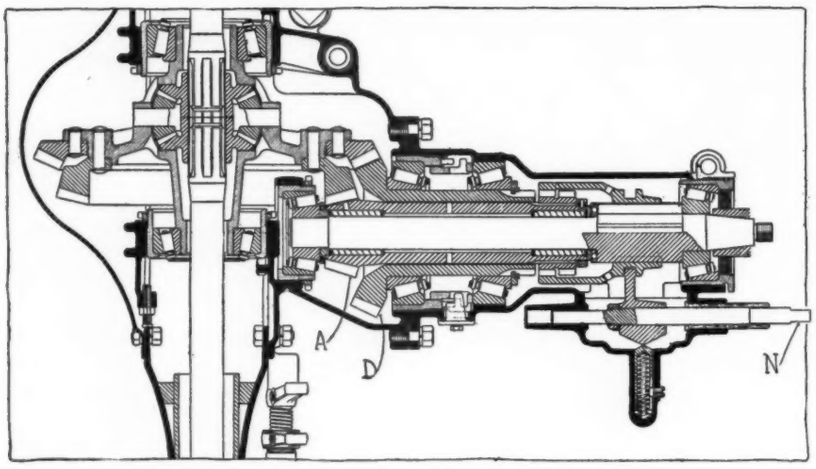


Fig. 2—Sectional view of the Cadillac two-speed rear axle.

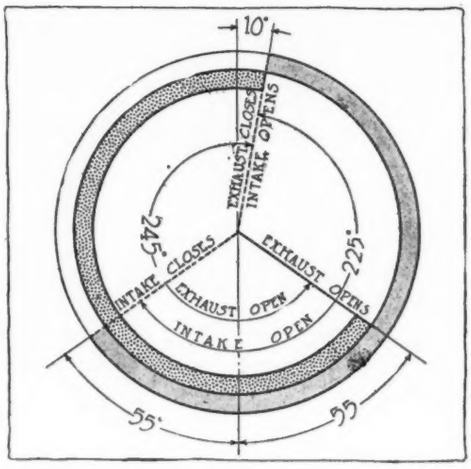


Fig. 3—Timing diagram of Stutz-Wisconsin racing motor

were sold in 1893 to the Palmer Tyre Limited of England, among the stockholders of which was the India Rubber, Gutta Percha and Telegraph Works Co., Ltd., of Silvertown, England, who manufactured the tires.

Thomas Sloper was an employee of this company in the capacity of experimental engineer and as such had much to do with the invention of the processes, devices and machinery that marked the development of the Palmer "cord" tire in England from its original form as a bicycle tire, both of single and double tube type, to what as made to-day for automobiles. I would here point out, however, that in principle and function, the only difference between the original tire and the tire of to-day is one of degree and not of kind.

The first patents covering the broad idea of the tire expired some years ago, and the Sloper patents referred to by your correspondent cover details of construction and machinery as used by the English company.

Concerning the U. S. patents of the original Palmer cord tire, they were purchased by the B. F. Goodrich Co., in 1898. After manufacturing the tire under license and for the Palmer Pneumatic Tire Co., from the beginning, they have manufactured the first Palmer cord tire made, as well as those tires that, carried by me to England in 1893, were used to annex all bicycle racing records from ¼ mile to 24 hr., enabling me to organize a company and sell the patents as previously indicated.

The foregoing is a brief, though accurate statement of the invention and history of the Palmer cord tire. It is not intended to deny credit to Mr. Sloper for anything he did. Much of modern practice and machinery as used by the B. F. Goodrich Co. in the manufacture of the Silvertown tire, is largely his work, as is evidenced by the United States patents, reference marks of which are molded on the tires; they also manufacture the original Palmer tire for bicycles, the first tire made of cord, each cord insulated by rubber and successive layers insulated from each other. In principle, functioning and efficiency, identical with the cord tire of to-day, differing only in those details made necessary by the heavier duty to be performed.

Riverside, Ill. J. F. PALMER.

Jet Velocity Has Indefinite Ratio

Editor THE AUTOMOBILE:—Will you kindly give me what information you can on the following:

Given—the bore, stroke, revolutions per minute for four or more points of an engine, the diameter of intake manifold on the carbureter—

To find—the diameter of jet, area of primary air passing by jet, amount of gas drawn out of jet by air with given velocity; the velocity of air passing jet. If venturi tube is used for primary air which increases velocity of air at jet 2:1 how much more gas drawn out—

To find—is amount of gas drawn out proportional to velocity of air past jet? If so, what constant is used?

U. of M. Ann Arbor, Mich. F. B. A. McD.

—Although from the data supplied the volume and velocity of the primary air can readily be determined theoretically, no practical calculation can be made due to the variation in volumetric efficiency of the motor and also due to the influence of the shape of the venturi and the shape of the jet. The results of practice are those obtained more by experimentation than by calculation. The amount of gasoline drawn through the jet does not bear a constant ratio to the velocity of air past the jet.

Two-Speed Axle Provided Two Ratios

Editor THE AUTOMOBILE:—Please explain the two-speed rear axle used on the Cadillac or any other car. Was it not a good thing? How much weight would it add to 20- or 25-hp. engine? Could it be applied to a Ford? Is it being used now and giving good satisfaction? Is it very expensive to build?

Fort Kent, Me. J. O. M.

—A diagram of the Cadillac two-speed rear axle as used on the stock models in 1915 is shown in Fig. 2. As a study of the axle will disclose, there were two sets of pinion and crown gear units, one pinion being at *D* and the other at *A*. Either of these could be thrown into engagement by means of the sliding jaw-clutch mechanism operated through the rod *N*.

Regarding whether or not it was a good appliance for the car is a matter of personal opinion, but it is greatly to be doubted if its use would be recommended on a small car such as the Ford. There is only one car at present using the two-speed rear axle and that is the Austin on which it is giving good satisfaction.

The expense of building would depend entirely on the quantity of production. If turned out in large quantities it would not be expensive, but for a few individual jobs it would be. The two-speed rear axle is covered very thoroughly by patents owned by the Austin company.

Timing of High-Speed Racing Motors

Editor THE AUTOMOBILE:—Please furnish us information on the timing of the high-speed motors such as the Stutz-Wisconsin, Peugeot, Mercer, Duesenberg and Maxwell.

Harrisburg, Pa. H. E. G.

—The timing on some of the motors you mention is kept a secret. On the Duesenberg motor the timing is as follows:

Exhaust valve opens 46 deg. before bottom dead center.
Exhaust valve closes 8 deg. after top center.
Intake opens 4 deg. after top center.
Intake closes 42 deg. after bottom center.
This is for the eight-valve motor.

On the racing Maxwell the intake opens at top dead center and closes 32 deg. past lower dead center. The exhaust opens 69 deg. before lower center and closes 13 deg. 45 min. after top dead center.

The timing of the Stutz-Wisconsin motor type JR 5 1/10 by 5½ is shown in the diagram given in Fig. 3.

Removing Clutch Spring of 1912 Westcott

Editor THE AUTOMOBILE:—Will you kindly show and explain by drawing how I could remove a clutch spring on a 1912 Westcott car, model R. The clutch has been slipping for some time, especially when I accelerate the motor while running on high speed. The leather was removed last spring and kept in good condition and I feel certain the difficulty is in a weak spring.

Buffalo, N. Y. K. J. S.

—To remove the clutch spring it is first necessary to remove the front universal joint and also the clutch cone sleeve. Then, by loosening the lock nut on the spindle or the shaft that goes through the clutch spring, access will be had to the large retaining nut that is also on the spindle of the shaft and controls the tension of the spring. By backing this large retaining nut off, the spring will gradually loosen.

It will be necessary to exercise a little care in this operation, as it is quite likely that due to the tension on the spring it might fly off and result in injury to the mechanic. When once the spring is removed, it is an easy matter to accomplish the taking out of the clutch proper.

The trouble you are having might very well be taken care of by simply increasing the tension on the spring through tightening the large retaining nut. It might also be well to note that the Westcott company figures the length of the clutch spring when compressed to be 2¼ in. from the inside flange of the clutch. This, of course, is measured less the distance of the face of the clutch outside of the edge of the flywheel.

Installing Dry Batteries on Detroiter 1914

Editor THE AUTOMOBILE:—I have a Detroiter, 1914 model, with an electric starter, but want to put dry cell batteries on for starting. Kindly give me a descriptive picture of the wiring and the necessary equipment needed for this job? Would like to take the starter off as it is always out of order.

Guilford, Mo. J. E. B.

—For your guidance in taking care of the electric system on your Detroiter, 1914 model, it is recommended that you secure a Remy instruction book from the Detroiter company.

It will not be necessary for you to make many changes in applying the set of dry batteries to the system. There is an extra pole on the ignition switch which takes care of the wiring of dry batteries. The system employed is low-tension and the circuit is opened by the use of the relay. As soon as the current is built up by the generator the relay is closed and the ignition is no longer taken from the battery but directly from the generator.

It is not evident why dry batteries should be installed, as it is hardly possible that the storage battery becomes so low that it cannot be used for ignition.

Switches Had No Idle Position

Editor THE AUTOMOBILE:—Why is the positive shunt lead carried all the way to the battery instead of grounded on the Bijur system on 1915 Scripps-Booth?

Newark, N. J. R. J.

—The wiring diagram for the Scripps-Booth is shown in Fig. 4—below—for all cars numbered from 1 to 1100, while above is shown the wiring diagram for cars numbered above 1100.

Referring to Fig. 4—below—the shunt lead is carried to the positive battery terminal instead of being grounded direct, so that removing the storage battery opens the shunt field circuit of the motor generator, which prevents any damage to this machine in case the gas motor is operated without the battery.

The starting switch, above, Fig. 4, has three positions, On, Off and Idle, and the field circuit of the motor generator is broken through this switch when the switch is moved to the Idle position, which would be the normal operating position when running the car without the storage battery.

Switches on cars from 1 to 1100 inclusive were not provided with the Idle position, hence the necessity of carrying the shunt field lead back to the positive of the storage battery.

Specific Gravity of Battery Electrolyte

Editor THE AUTOMOBILE:—If the specific gravity of the electrolyte in a storage battery has a reading of 1.250 at a temperature of 70 deg. Fahr., what should the reading be at a temperature of 60 deg., 50 deg. or 20 deg., assuming that the battery is in the same condition?

Stroudsburg, Pa. M. F. H.

—If the electrolyte has a specific gravity of 1.250 at 70 deg. Fahr. the reading will be 1.254 at 60 deg., 1.258 at 50 deg. and 1.270 at 20 deg. There is a variation of 0.0004 for each degree of temperature.

Outer Wheel Exerts Driving Power

Editor THE AUTOMOBILE:—How is the power divided on the rear wheels of an automobile going around turns at right angles? Is the power equal on both wheels or is there more on one wheel than on the other?

Lorain, Ohio. W. GEM.

—In turning a curve at right angles the power is exerted by the outside wheel while the inside wheel simply acts as a pivot point.

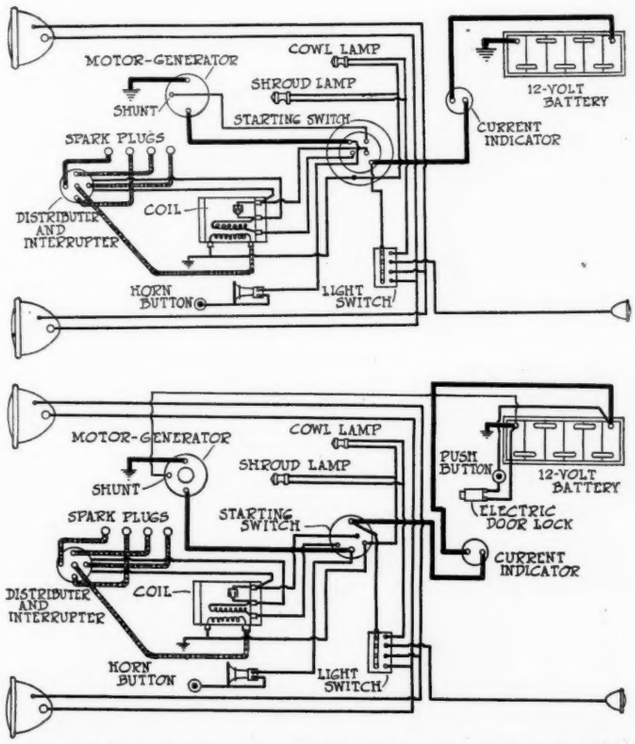


Fig. 4—Wiring diagram of Scripps-Booth cars. Upper for cars above No. 1100 and below from 1 to 1100

The FORVM

CHAS. E. DURYEA DISCUSSES POINTS IN STEERING GEAR LAYOUT—THINKS TILTED PIVOT IS A REAL ADVANTAGE—CASTOR ACTION IMPORTANT

Improving the Car's Steering

By Chas. E. Duryea

PHILADELPHIA, PA.—Editor THE AUTOMOBILE:—I trust A. L. Clayden will permit me to call attention to some errors in his article on steering in THE AUTOMOBILE for Sept. 2. This subject has been badly neglected by makers and yet is of vital importance to drivers if we may believe the published reports of accidents due to the steering going wrong. Good steerings can be had so easily and, as Mr. Clayden says, are so superior that any one who has had one will not be satisfied with any other.

With regard to Fig. 1, Mr. Clayden leaves the reader with the impression that faulty steering angles may cause the rear wheels to skid; or one of them to do so. This seems incorrect. The rears act just as the wheels of a hand cart and no manipulation of the front end of a hand cart will cause the rears to skid unless it be swung bodily to one side, a condition that cannot exist if one front wheel still rolls, as he rightly says it will. In other words the angle error of the front wheels gives rise to a powerful force parallel to the front axle but so nearly equal on both front wheels that the effect on the rears is negligible and skidding of the rears would not relieve the fronts for it would not change their angles.

Proper Castor Effect

The most important part about steering is the proper castor effect. The best steerings get the pivot line into the wheel contact line or near to it and so force the pivot to take the thrust and thus relieve the steering parts and the operator. Steering would be much safer if all cars were thus equipped and we should keep hammering at the matter till they are. While inclining the wheels outward is not the proper solution, as Mr. Clayden correctly points out, it is so much better than nothing that it is advised next to the proper arrangement. A trial will demonstrate this in spite of Mr. Clayden's mathematical demonstration.

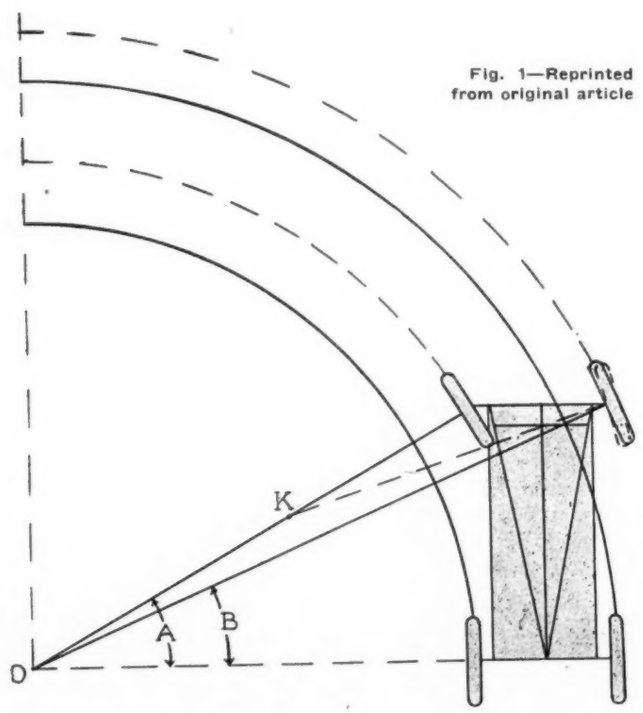


Fig. 1—Reprinted from original article

If the Tie Rod Breaks

He seems to be wrong in assuming that the driving thrust is applied "at the center of the wheel in the plane of the wheel." It is not necessarily so. The rear wheels push the front axle. If the tie bar holds, the front spindles are kept from turning by it and pushed by the front axle in the usual arrangement but what happens if the tie bar should break? With the usual arrangement the front wheel that is not connected also to the drag link will swing around across the car and an accident follows. If Mr. Clayden's arguments are correct this is what will happen with any arrangement except the one which has the pivot inside the hub and in the wheel plane. But the facts are not so. Mr. Clayden has driven Duryea cars and surely knows that they will run over a brick with the driver's hands off the control just as will a bicycle and everybody knows that a bicycle, having the pivot in the wheel plane, cannot be beaten for steering. With the inclined pivot shown in Fig. 10 the tie bar may be disconnected and the wheel will continue its course. This has been demonstrated many times and can be again when wanted. Mr. Clayden must therefore revise his explanation.

By inclining the pivot line slightly more so as to cross the wheel plane above the contact point we can make the wheel pivot resist such strains as that of running over a brick.

But there is another essential to good steering. Putting the pivot line into the contact line or near it is not enough. The castor effect must be introduced. Everybody knows the ordinary furniture castor. Its pivot and wheel plane are both vertical. Its essential feature is having the pivot line ahead of the wheel contact on the ground. It so happens

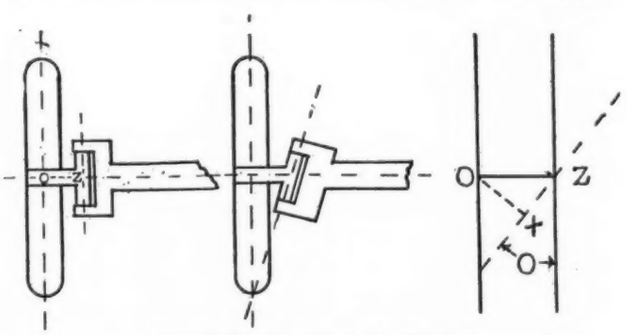


Fig. 10—Diagram of inclined pivot

that its pivot is in the plane of the wheel but this is not essential as Mr. Clayden thinks and states.

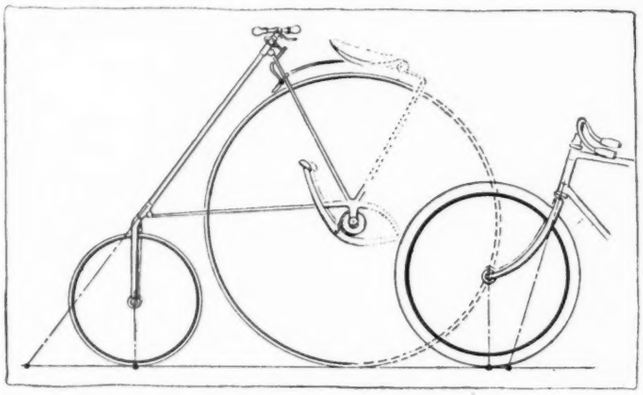
Push—Not Weight

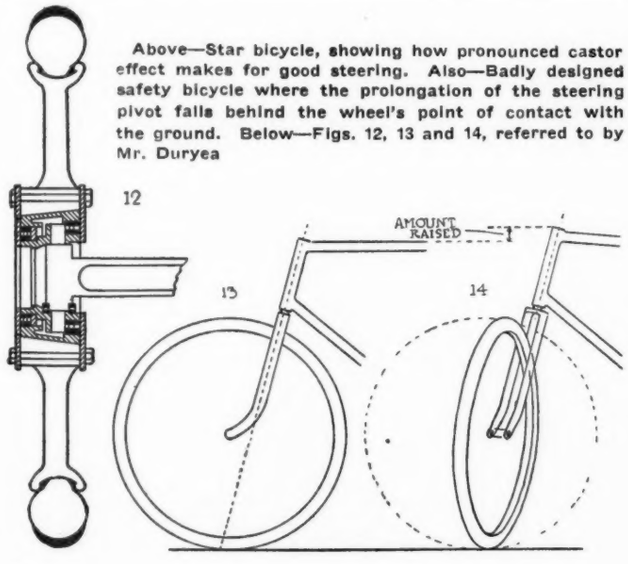
The thing that makes a furniture castor operate is push; not weight as Mr. Clayden states. Lean a bicycle and the weight of the wheel in front of the pivot being greater than that behind the pivot, as seen in Fig. 13, makes the wheel turn to the lower side. But propel or push the bicycle and its steering wheel at once straightens up against the weight action and it travels in the line of the push. This is true castor action and just what is desired in an automobile. Why makers are so slow about incorporating it is one of the things no man can find out. Mr. Clayden will reply that he means vehicle weight and not wheel weight as the operating force. So I will be obliged to ask him to refer to the Star or Eagle cycles in which there is no question about turning the wheel lowering the weight. See the accompanying sketch. They were the best steerers ever made. When they were leaned it was the weight of the machine added to the weight of the wheel that caused the wheel to turn to one side. In some cycles there is a slight raising of the frame when the wheel is turned from its plane but this is so slight as to be negligible. It can be very much increased, however, by setting the steering pivot behind the contact point and if Mr. Clayden is correct this should render the steering more certain. It does just the reverse and most cycle riders have difficulty with such a device.

Weight Factor Unimportant

In most automobiles the load is carried by the top end of the forked front axle which is higher than the wheel axis and so the highest position of the load is when the contact is at the lower end of a line through the axis and carrying point. Most steering pivots are so nearly vertical that the deviation from this highest point is very slight. As a matter of fact, in automobile steering the weight has very little to do with the wheel position for one wheel turns one way and the other turns the other way and what one wheel loses by lifting the load the other gains by lowering it.

The castor effect is the only one responsible for the self-steering action. And this castor effect can be practically as well obtained by inclining the pivots as by more expensive methods. The inclined pivot costs no more than a vertical one and makers will use it if buyers demand it.—CHAS. E. DURYEA, Consulting Engineer.





Above—Star bicycle, showing how pronounced castor effect makes for good steering. Also—Badly designed safety bicycle where the prolongation of the steering pivot falls behind the wheel's point of contact with the ground. Below—Figs. 12, 13 and 14, referred to by Mr. Duryea

Mulholland Makes De Luxe Ambulance

WHAT has been described as the ambulance de luxe was shipped, recently, by the Mulholland Body Co., Dunkirk, N. Y., in connection with a Cadillac eight chassis, to the Houston Motor Car Co. of Houston, Tex. This car is probably one of the most completely equipped ambulances on the market, having a spring cot, seats for the doctor and nurse, compartments for stretchers, medicine cabinet and pulmotor. The car contains a heater operating from the exhaust, speaking tubes, electric fans, electric dome lights, sanitary waste container, hot and cold running water with washstand, water cooler, ventilators, silk curtains, plate glass sashless windows running in velvet covered grooves, and the body itself is designed with rounded corners within to avoid the necessity of cleaning dust.

The ambulance body has an ash frame with the paneling interior and exterior of Vehisote. The cowl and fore doors are of sheet steel and here also the corners are all rounded. The stretcher compartment measures 7½ by 8 by 46 in. It contains one stretcher and in order that this may be accommodated it is hinged in the center, allowing it to be doubled.

The medicine cabinet is a drawer beneath the spring cot and measures 8 in. by 9¾ in. by 25 in. The pulmotor is also in a drawer under the spring cot in a compartment which is adaptable to the pulmotor as regards size.

The car is heated by the Dunco heater made by the Dunkirk Corp. of this city. It is a hot air type with the register located in the front of the car and the heat is secured by placing a hot air jacket around one of the mufflers, this method providing ample heat for the purpose. The electric fan is located in front of the car directly in front of the washstand and the current for running it is secured from the storage battery which is part of the standard equipment.

In order to secure hot and cold water for the wash basin, two tanks were built under the driver's seat and into these tanks the regular air line was tapped. This is the line which provides the pressure on a gasoline tank. The hot water is secured by placing a copper waterjacket around one muffler and in this way with a two-way faucet arrangement either hot or cold water may be obtained at 2-lb. pressure.

Book on Lathes

THE South Bend Lathe Works, South Bend, Ind., has issued a useful booklet dealing with the practical problems of lathe operation in a practical manner. Not only is there a great deal of information given on the actual working of the machine, but its setting up, shop location, power drive and countershaft installation are covered in detail. Screw-cutting, taper turning, keyway and other special work, the use of the compound gearing, tool grinding, drilling, valve work, boring and tool tempering are a few of the many subjects treated. The booklet is of the genuinely helpful kind, and there are not a few things in it that may be of use to the old lathe hand.

The History of the American Automobile Industry—15

Early Development of the Gasoline Engine—Basic Ideas in Hot Air Engines Invented Centuries Ago —Tracing Their Evolution From the Days of Hero

By David Beecroft

THE previous chapters of this history have largely had to do with the development of steam vehicles, dating from the earliest times and including those developed up to 1890. Beginning with 1898, there was a very great development in steam vehicles which continued for eight or nine years, and which has continued itself up to the present in the Stanley steam car. Before taking up the history of this recent rise in steam, in which more than fifty different manufacturers were producing vehicles at the same time, it has been deemed better to leave this for later chapters, and to refer now to the early development of the gasoline engine as we know it to-day.

Gas Engine's Development

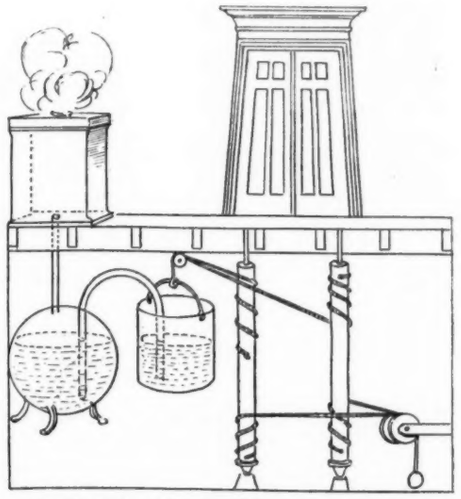
It is practically as difficult to trace the development of the modern internal combustion engine, in fact more difficult, than to follow the thread of steam evolution through the past centuries. The modern internal combustion engine, which we know to-day as the gasoline engine, did not start as an internal combustion engine. Some of the basic principles of it were discovered centuries ago before we had any of the modern hydrocarbon fuels such as gasoline or kerosene, so that those who expect the history of the gasoline engine to be a continuous chapter of development, with one kind of fuel, will be disappointed.

Hot-Air Engines First

The origin of the present-day gasoline engine started centuries ago in the form of hot-air engines. Here it might be added that an air engine is one in which the working medium is air, heated or compressed, as distinguished from steam in the steam engine, or a charge of explosive gas in an internal combustion engine, as we know it to-day. All three types, namely, air, steam and combustion engines, are heat engines. Heat is the great essential in all, and it is for this reason and because of this similarity existing among them that it is desirable to go back and carry the thread of development of air and explosive engines up through the centuries alongside of steam before entering into the history of the present-day automobile as dating from 1885 in Europe. All three forms of engines, air, steam and combustion, were developed very closely together under the same difficulties and for the same purpose. The inventors in one line have constantly made use of devices developed in another line, and in trying to give an accurate presentation of the facts as they occurred the difficulty is to show how closely they were related to each other in this early period rather than to attempt to separate them, as they have since in their respective growths separated themselves. It is particularly interesting to watch how the modern engine developed and how each step led to its successor.

Hero's Air Engine

The first recorded use of expanded air to do mechanical work seems to be that of opening the doors of temples described by Hero, 130 B. C., in which a very simple contrivance accomplished the result. When a fire was built upon an altar the heat expanded the air contained in the hollow underneath the altar, which air forced water out of a bottle into an open pail through a curved pipe or syphon. The weight of the water in the pail opened the doors against counterweights. When the altar cooled the water syphoned back into the original bottle, lightening the pail and permitting the counterweights to close the doors.

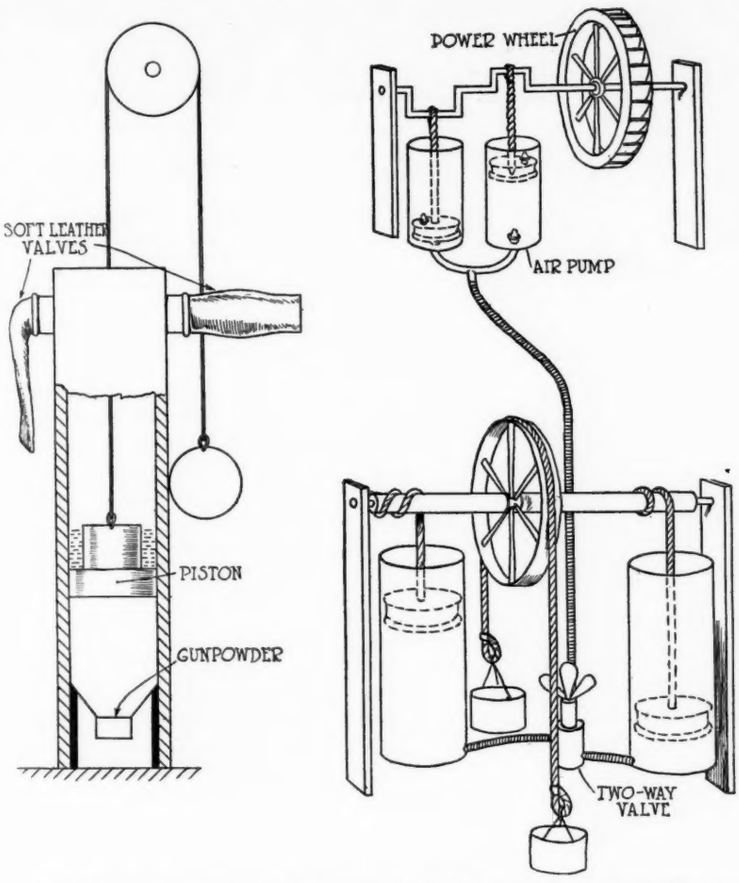


Hero's device, the first known to do mechanical work with expanded air. It was used for closing the doors of temples. A fire on the altar heated the air in a hollow beneath it so that it forced water from a bottle into an open pail through a syphon, the weight of the water opening the doors against counterweights. When the altar cooled the water syphoned into the bottle and as its weight was removed from the pail the counterweights closed the doors.

After the invention of gunpowder the Abbé Jean Hautefeuille of Orleans,

France, in 1678, described a perpetual pendulum which was a sort of cannon in which gunpowder explosions were produced and which could be employed to raise water much as a modern pulsometer pistonless steam pump.

Two years later Huygens, Holland, described a gunpowder engine consisting of a cylinder open at the top and fitted with a screwed breech in which gunpowder could be placed and fired. The ignition of the powder filled the cylinder with flame and gases, driving the piston to the top and then escaping through exhaust valves formed of leather tubes. These tubes would flatten immediately and prevent air from entering until the piston had passed them on its downward movement, which movement was accelerated by atmospheric pressure, the gases inside cooling and condensing as the piston went downward. A rope over a pulley with a weight on the other end served to communicate power to the pulley shaft. This engine is, therefore, seen to be a complete device depending solely upon the means for introducing and firing the powder, and limited mostly by the cost of fuel. About the same time Papin, France, was working along much the same line, except that he gave preference to steam instead of powder.



Left—Huygens' gunpowder engine, in which the flame and gas of the explosion threw the piston upward, the leather exhaust tubes flattening as the piston dropped and preventing air from entering until the piston passed them. A rope, pulley and weight communicated power to the pulley shaft. Right—Papin's engine, which was built along lines similar to the Huygens construction except that steam instead of powder was used. This engine was used or raising any sort of weight out of a deep mine.

John Barber's Patent

John Barber of England took out a patent in October, 1791, in which he shows two retorts to be used alternately, one being cooled and cleaned and refilled while the other is in service. These retorts, being heated gave off vapors that could be burned, and these vapors passed to a water-cooled holder. Air, water and gas from this holder were all pumped to an exploder chamber. When flame was applied to the outlet of this chamber a violent blast resulted, which, being directed against a multiplicity of vanes projecting from the rim of a wheel, caused the wheel to turn. His pumps seem to have been slow acting, and so this blast effect was most likely not continuous. His mechanism would undoubtedly have served much better if used with a piston and cylinder than with a turbine which could not have had much efficiency.

Another Englishman, Thomas Mead, in 1794, patented a very crude device for generating either vacuum or pressure by the use of heat. This was a large cylinder with cocks at top and bottom and a grate for carrying coals which could be introduced by removing the top head of the cylinder. When the top head was replaced the grate would be released and allowed to move downward as the air below passed through the grate, which passage heated and expanded it and created a pressure and volume that could be used to perform work. If not otherwise used this pressure would drive downward a piston fitted near the bottom of the cylinder. When the grate reached its limit of downward movement, opening and closing the top cock would reduce the pressure to zero, followed by cooling of the hot gases and a vacuum which would raise the piston. Then, opening both cocks, the grate would be raised, expelling the burned gas from above it and drawing fresh air in below. The operation would then be repeated until the coals were burned and the grate had to be taken out for recharging.

Robert Street's Heat Engine

In May, 1794, Robert Street, also an Englishman, patented an engine driven by the force of inflammable vapor produced from "liquid, air, fire and flame." It seems that he used the vertical cylinder with its bottom or head heated practically red hot. On this he dropped tar, turpentine, or some similar liquid easily and quickly vaporized, which vapors, mixing with air, drawn in by a short initial lift given the piston, drove the piston upward, possibly by a hand lever and ignited by a torch, escaping at the top of the stroke and followed by a return or downward movement of the piston, doubtless assisted by atmospheric pressure. That he understood and used the device is shown by his statement that ten or twelve drops of fuel should be used with each cubic foot of air drawn in.

Requirements of Tractor Design

Three Schools of Tractor Engineering Produce Different Machines—Tendency Towards Automobile Engineering Rather than Gas Engine Construction*

By C. M. Eason
Engineer Hyatt Roller Bearing Company

WHILE the detail of tractor construction is different from any other, yet it is possible to group tractors under three general classifications. First: the heavy type based on stationary engine practice; Second: the so-called automobile type, embodying a great many features found in present day automobile construction; and Third: a composite type, which, in a modified form, contains certain features common to either of the other two types. Back of every tractor design are certain specific reasons for the construction used. It will doubtless be of interest to present some of these reasons as advanced by the engineers responsible for the different designs.

The builders of the heavy type tractors declare that any machine to be a success at farm work must be made very heavy to stand the rough usage and continuous service. To this end they employ slow speed single or double cylindered motors having rather large cylinder dimensions. They make all of the bearing surfaces extremely large, using babbitt or bronze bushings practically throughout. The transmission systems of these tractors are usually rough cast gears of coarse pitch and large diameter. Owing to the difficulty of inclosing these large gears they are usually run in the open, and some mechanical means of lubrication for the gear faces is employed. Frames and wheels are also necessarily very heavy. The carburetion, ignition and cooling systems are usually reduced to the utmost simplicity, and, being designed for practically constant speed and load, there is very little necessity for fine adjustment or flexible control. They point to the fact that all other farm machinery is comparatively crude in design, cast and malleable iron, rough bar forgings and similar construction being used almost exclusively. They state that while this type of construction may be crude from a mechanical standpoint, that it is better understood and easier taken care of by the average farmer than a machine of higher mechanical refinement. They further state that a single-cylinder motor will give a farmer just half as much trouble as a two-cylinder, and one-fourth, as much trouble as a four, and being less sensitive to delicate adjustment will run for a greater length of time without proper attention than any other type.

The designers of tractors built along automobile lines claim that fundamentally the use of single or double cylinders or large diameters is incorrect for tractor duty, because it is necessary to make all of the design so extremely heavy to obtain proper wearing surface or bearing area. It is a well established principle of automobile motor design that the effective life is proportionate to the area of the uncooled parts (*i.e.* valves and piston heads), and to the weight of the reciprocating parts. Motors having small bores, small diameter valves, light pistons and light connecting-rods will show a greater effective life than motors of larger dimensions and heavier reciprocating parts. To substantiate this argument they point to the fact that automobile designers are working toward greater reliability with less attention and that this has led them to the development of six-, eight- and twelve-cylinder motors which have been proved to have a greater effective life than motors of equal horsepower by smaller number of cylinders. They further state that the life of a motor is dependent upon the ratio of bearing surface to piston area, and that it is possible to get a lower pressure per square inch on the crankshaft and connecting-rod bearings of a multiple-cylinder engine, than would be practical with single-cylinder motors of the same horsepower. It is also said that for a given power it is easier to build multiple cylinders than single cylinders due to the greater facility for handling small parts in duplicate. As to gears and shafts of the transmission system they point out that an alloy steel gear properly heat treated only weighs about 15 per cent as much as a cast iron gear for transmitting a given power, and that after taking into consideration the cutting, hardening and extra handling of the smaller piece they can actually be produced for the same or less money than the heavier gear of cheaper material. They also maintain that the only way to insure reliable operation in a transmission system is to absolutely protect same from dust and dirt and run it in a bath of oil. To accomplish this it is, of course, necessary to have dust proof and oil tight cases making self-contained units of the transmission system. This type of construction permits the use of some type of anti-friction bearing instead of plain babbitt or bronze and insures a high percentage of the motor power being delivered to the drive wheel.

Carrying out this type of construction to its logical conclusion will result in the production of a tractor weighing about one-third as much as a tractor built along the lines of the heavy single-cylinder, slow-speed motor. Whether this construction will be entirely too light for tractor service remains to be proved by actual experience in the field with tractors of each type working under similar conditions. So far there are, at least in fairly successful operation, tractors of both types. It would seem that an answer to the question as to which will predominate in the future must wait until more practical experience has been obtained.

Most of the experienced tractor designers of to-day have brought out during the past year, or are preparing to bring out next year, tractors which show plainly a combination of both the heavy type and the automobile type of construction. The arguments which they advance for this composite type are substantially the same as advanced by the advocates of the two extreme types. They qualify all of these arguments by saying that a tractor is neither a perambulating stationary power plant nor a pleasure car, and is unlike the motor truck, being a distinct and separate type of machine. Some of the tractors produced in this class have been developed from the stationary type as a basis and brought to their present form by cutting down sizes where permissible, using better materials where greater strength was required and applying anti-friction bearings at the points where the loads are heaviest. Others in this same class have been developed from the light weight construction, as a starting point, by building up and strengthening various parts as they have developed weaknesses in the field.

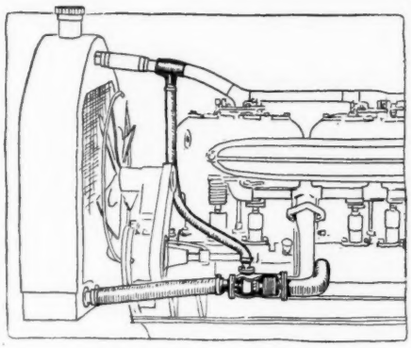
*Extracts from a paper read by Mr. Eason at an agricultural engineers' convention held recently in Chicago.

ACCESSORIES

Sylphon Circulation Regulator

THIS regulator, which is already a standard feature of equipment with several car manufacturers, is designed to keep the temperature of the cooling water constant. When the engine is started the Sylphon device diverts the circulation until the temperature of the water in the cylinder jackets reaches a point at which the engine operates most efficiently, when it automatically starts a gradual circulation. The same temperature is maintained around the cylinders until circulation is complete. The device is a thermostatic arrangement using a metal coil which responds readily to changes in temperature.

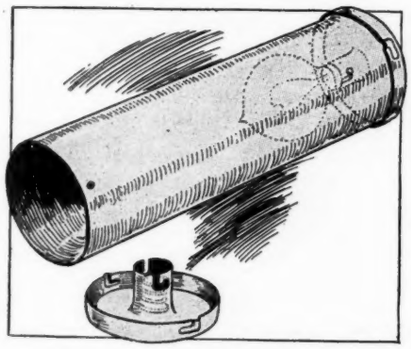
The regulator is claimed by the manufacturer to heat the engine to correct operating temperature 1 min. after starting, preventing backfiring due to cold cylinders; to render unnecessary carbureter adjustments due to weather changes; to promote lubrication; to reduce wear in cylinders and pistons by preventing inequalities of expansion and contraction; to prevent rapid cooling of the motor when not running, thus insuring quick getaway, and to reduce gasoline consumption and carbonization. The device is entirely automatic and is claimed to outlast the car on which it is mounted, no adjustments or repairs being necessary.—Fulton Co., Knoxville, Tenn.



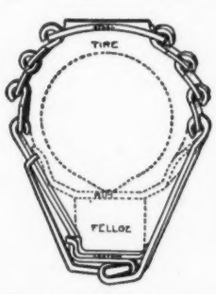
Sylphon circulation regulator

Boyce Midget Model Motometer

Similar in design and construction to the Standard and Junior models of the Boyce Motometer, the Midget is specially designed for use on small and light cars. It is accurate and well built, being 2¼ in. in diameter and finished in nickel with black dial. Like the Junior, it has no glass over the thermometer scale. A special center screw is required for mounting the device on Overland cars, this screw selling for 50 cents extra. The Midget model Motometer inserts through a ⅞ in. hole in the radiator cap and bolts in place. It sells for $2.50.—Motometer Co., Inc., New York City.



Dover electric bulb case



Kimball cam-locked non-skid chain

Kimball Skid Chain

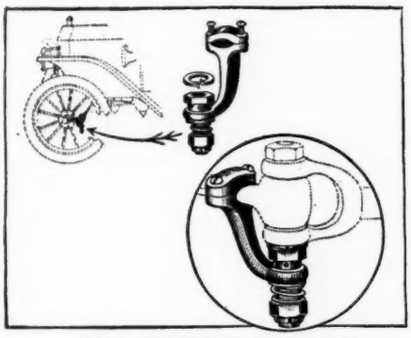
Six clasps encircling the tire constitute the anti-skid provision for each wheel of the car. The clasps are locked by a cam device and when in place press into the rubber and stick to it. The clasp is flat steel ⅛-in. thick with a tread plate 3 in. wide and links 1¼ in. wide. A strip of leather prevents the marring of the varnish on the felloe. One or more of the clasps may also be used as a blowout patch.—Kimball Tire Case Co., Council Bluffs, Iowa.

Sapp's Accelerator for Fords

This foot accelerator is attachable to the Ford without machine work or fitting. The foot piece is attached to the top of the gearcase by two of the screws that hold the cover and connection with the throttle is made through a wire cable. A spring returns the throttle when the pressure of the foot is removed. The device does not interfere with the use of the hand throttle. The outfit weighs less than 1 lb. Price, $1.65.—Will A. Sapp, Elgin, Neb.

Dover Lamp Bulb Case

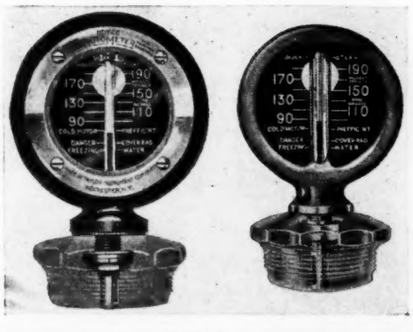
Two Ford headlight bulbs are contained in this 7½ by 2¼-in. cylindrical steel case, one bulb being held securely at each end of the case by spring-backed bayonet locks so that it can neither rattle nor work loose. The Ford bulb case, as illustrated, sells for 35 cents, without the bulbs. The company also manufactures cases for other assortments of lamps.—Dover Stamping & Mfg. Co., Cambridge, Mass.



King anti-rattler for tie rods

King Anti-Rattler for Fords

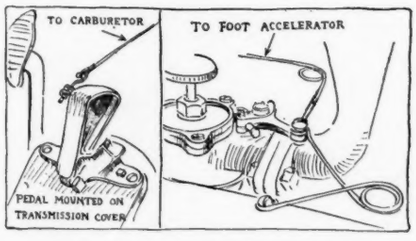
These clamps are designed to prevent rattle due to a loose tie-rod on a Ford or Overland car. No machine work is required in installing a pair of the clamps and they may be attached in a few minutes. Price per pair, for Fords $1; for Overlands $1.50.—King Specialty Mfg. Co., Brookline, Mass.



Left—Boyce Motometer. Right—Boyce Motometer Junior

Whitaker's Water Bags

Whitaker Egyptian water bags are woven of special flax and when filled allow a little moisture to exude, the evaporation of this keeping the water within cool despite hot weather. The tops are closed by a steel wire device which per-



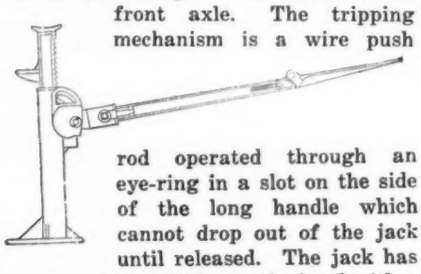
Sapp's accelerator for Fords

Whitaker's bag for cooling water

mits the bag to be turned inside out for cleaning and drying. The ½-gal. open top type bag sells for 95 cents, the 1-gal. for $1, 2½-gal. for $1.50, 3½-gal., $2, 5-gal., $2.50. Furnished with closed top, the ½-gal. size is listed at 85 cents, the 1-gal. at 90 cents, 2½-gal. at $1.35, 3½-gal., $1.85 and 5-gal., $2.25.—Whitaker Mfg. Co., Chicago, Ill.

Hartford Red Rack Jack

One of the main advantages of this jack is that it can be placed under the axle of the car and raised and lowered by the operator from a standing position, it being unnecessary to crouch under the rear of the car. This is accomplished by means of a 26-in. hinged extension lever handle which, when folded, is only 14½ in. long and which is easily detached by depressing a spring. The jack has heavy double ratchets and pawls and an extra step for use under a low front axle. The tripping mechanism is a wire push

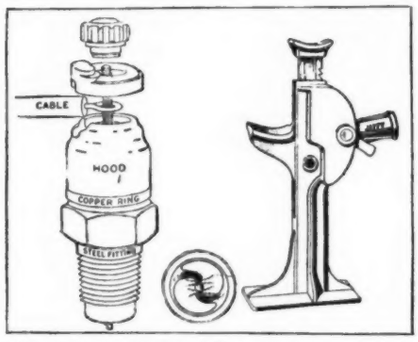


rod operated through an eye-ring in a slot on the side of the long handle which cannot drop out of the jack until released. The jack has a range of 11 to 18 in. on the head with a further minimum of 8⅛ in. for the front axle step. The jack weighs only 7 lb., although the ribbed base is very broad to give perfect stability. The name is derived from the red enamel finish of the toothed rack, the rest of the jack being finished in black. It sells for $2.50.

The company also manufactures the Hartford jack which operates by a ratchet, a pinion meshing with a large gear, the movement of the latter being directly communicated to a pinion engaging the rack on the moving upright. This jack is finished in black enamel and packed in a canvas bag. It lists at $6.50.—Hartford Suspension Co., Jersey City, N. J.

Hinckley Milling Attachment

A drill-press is converted into a milling machine by the use of this device and will cut straight, taper or Woodruff keyways, straight or curved grooves, finish semi-cylindrical bushings and the like, and so on. The attachment, which will go on any drill-press from 14 to 42 in., consists of a 12½-in. circular base with graduated circle carrying traverse slides moving 12 in. longitudinally and 7 in. across, and a vise opening 10 in. T-slots are also provided in the table for clamping work that the vise will not accommodate. The cutters used are regular stock sizes and do not have to be specially made. They fit in the taper drill sockets. Price, $48.—Hinckley Machine Works, Hinckley, Ill.



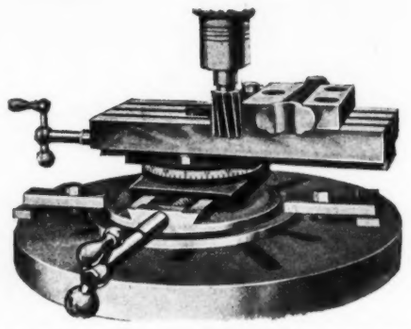
Left—Herz Pro-Mo-Tor spark plug for Fords. Right—Jiffy jack for garage use

Jiffy Jack for Garages

This new Jiffy jack is called the Indestructo and is intended especially for garage work. The short stroke permits the use of a long handle while the base is large. Its normal capacity is 2000 lb. though it will stand 100 per cent overload. The jack is 11½ in. high and the lift is 7 in., there being an auxiliary step 7 in. from the base. Price, $2.50.—Jiffy Jack Co., Cleveland, Ohio.

Herz Pro-Mo-Tor Spark Plug

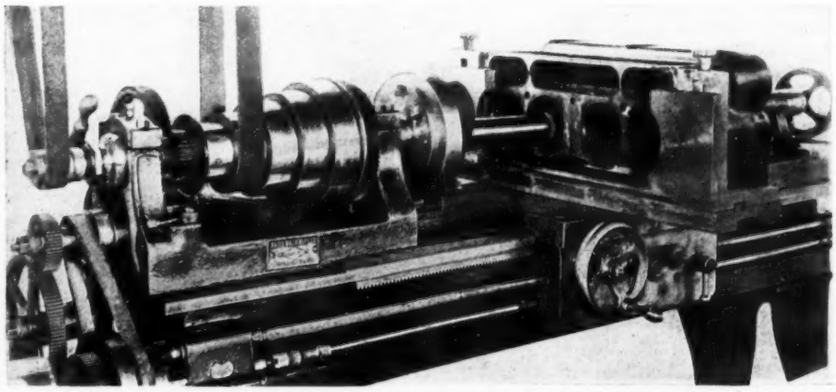
This plug, which is designed for Ford cars, is claimed to be self-cleaning, soot, water, dust and shock proof. A propeller-shaped disk forming the outside electrode is stated to prevent the settling of carbon and oil in the combustion chamber. This disk produces a whirling action which tends to keep the plug chamber clean. A rubber cap protects the high-tension cable terminal from water and dirt, fitting over the top of the plug as illustrated. The hood of the plug is stone with a copper ring fitted to its lower end. The plug sells for $1.—Herz & Co., New York City.



Hinckley miller attachable to any drill press

Woods Lathe Attachment

This boring and grinding attachment may be fitted to a 16-in. lathe and with regular equipment will bore and grind cylinders from 2½ to 5¼ in. in diameter and 11 in. deep. Both the grinder and the boring bar are attached to the lathe faceplate, the grinding arm outfit including the gearing for driving the two grinding wheels furnished, which are 2⅜ and 3½ in. in diameter, respectively. The spindle runs in S. K. F. double-row ball bearings and the drive shaft also runs on balls, all bearings being protected from dirt. An eccentric system is used for micrometer adjustments. The outfit includes the lathe attachment itself with grinding wheels and boring head, overhead countershaft, cross slide for the lathe carriage with two adjustable angle plates having vertical screw adjustment and T-slots for bolts, special faceplate, diamond grinding wheel, dressing tool and wrenches. The milling machine attachment is necessarily constructed to adapt the outfit to the miller.—Woods Engineering Co., Alliance, Ohio.



Woods boring attachment in place on 16-inch lathe arranged for grinding

The Automobile

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Driver's Comfort

IF comfort is defined as the state of being at ease, there is no doubt but that there is room for improvement in a great many cars, particularly as regards the driving seat. No criticism can be made of the room in the tonneau of the 1916 car, but it is a question if some of this room is not being obtained at the expense of the driving compartment, thus providing a superabundance of space in the rear while the occupants of the front seats, especially the driver, suffer.

There are many important details about the design of the driver's seat, and not only do these details affect the sitting posture but also the convenience of control. The handling of the steering wheel, gearshifter lever, instruments on the control board, brake, clutch and accelerator pedals keep the hands and feet of the driver of such a variable-speed vehicle as the automobile constantly on the move. The movements of driving amount to a material total after the end of a day's run and careful motion study on the part of the designer would certainly be thankfully received by the occupant of the driver's seat.

Probably the driver himself would not be able to tell why he left the seat of one car feeling fresh and fit to continue the journey after a run of a whole day, while on another car he was weary before half the day was over. The position in the seat, reach for the pedals, position of the feet and arms, all have their influence. It is an important matter to have the driver's seat correct. The man who foots the bills of motoring should receive careful attention, and since 90 per cent of the owners of cars drive, it behooves the manufacturer and designer to realize what an important personage the driver is after all.

The Agricultural Tractor

THE revolutionizing influence of the internal combustion motor is once more demonstrated by the fact that separate tractor expositions are being held in the Mississippi Valley. Minneapolis is holding one this week, Kansas City will hold one next week. It is surprising that exhibitions have not been held before this date.

The expositions have a suggestion for the automobile dealer, who up to the present has not taken the agricultural tractor seriously, but who during the past year has realized that a large source of revenue is within his reach through the tractor field. Automobile dealers are the logical persons to handle the tractor business. They are familiar with the internal combustion motor, and because of this are in a much better position to give real service to tractor owners than many implement dealers to whom the internal combustion motor is not so well known.

After-War Exports

IN considering the position of the American automobile industry at the conclusion of the war, there is one point that is liable to be overlooked and this is that the ability of the European manufacturing industry to compete with imported American vehicles may be greatly different from what it was before the war. Practically every factory in Europe is now much better equipped than it used to be because every available plant is operating on munition work and great quantities of new machinery have been bought to facilitate the production of articles needed by the armies. As soon as the demand for munitions ceases the automobile plants of Europe will find themselves much better supplied with tools than ever before while they will also have workmen who have been trained to operate modern American machinery at a higher speed than has previously been the custom in Europe.

The opinion is now being expressed fairly freely in England and France that manufacturers will be able to make automobiles for considerably less money and that therefore it will be easier to fight American competition. The moral is that American manufacturers must be ready to meet severe competition and prepare for a drop in the average selling price of European cars. At present, in regard to the abnormal cost of Atlantic freight there is ample margin between the factory cost here and the selling price in Europe. Economies can undoubtedly be effected between the American factory and the ultimate European owner. The object is one that should be given close attention so that plans may be laid beforehand.

260,000 See Chicago Exhibition

30,000 Were from Out of Town —Ticket Rebates to Pay for Dealers' Space

CHICAGO, ILL., Jan. 29—As near as could be estimated by Manager Samuel A. Miles, 260,000 persons entered the Coliseum during the week of the Chicago show. This is about 8000 greater than the New York attendance. Of these, 30,000 were visitors from out of town and included dealers, salesmen, owners and prospective owners. There were 3500 exhibitors and salesmen; there were 3000 dealers from all parts of the United States and Canada; even one from South Africa.

Based on the attendance figures it is estimated that the exhibitors will receive on rebate from the ticket sales enough to pay for the rental of their space. The increase in attendance is about 22 per cent over last year's figure, according to Miles. Last year the show paid back to exhibitors who are members of the National Automobile Chamber of Commerce and of the Motor and Accessory Manufacturers over 80 per cent of the amount paid for space rental. The indications are this year that they will receive nearly 100 per cent.

From a business standpoint, the exhibitors are almost a unit in agreeing that the show surpassed any previous records set up by earlier events at Chicago. Most of them have found also, that it was a better business show than the recent New York exhibition. This is the opinion of accessory exhibitors as well as car exhibitors.

In accounting for the statements that when the sales results are checked up, the Windy City show will outshine that of Gotham, a number of theories are given. It is the belief of most that the territory from which Chicago draws its dealer attendance is less restricted than that of New York, and consequently the dealers at the Chicago show represent a greater buying territory. Add to this the fact that many dealers visit the New York show for a general view of the offerings and have come to a decision and are ready to close at Chicago. A rather interesting explanation is that given by some of the accessory men that dealers and jobbers go to New York for a good time and come to Chicago for business.

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Lee and Michelin Tire Prices Raised

NEW YORK CITY, Feb. 1—General advances in prices for tires were announced yesterday afternoon by the Lee Tire Co. The puncture-proof tires have been advanced 15 per cent, while all other grades are 10 per cent higher.

The Michelin company this morning raised its prices 10 to 15 per cent. Though the Nassau prices are as yet unchanged, it is expected that before the week is over this company will announce a new schedule.

On its plain tread types, the Lee company has advanced its prices in some cases over $2 a tire, for instance on the 28 by 3 the new price is $19.75 as compared with $17.15; the new price on the 34 by 3 is $23.65 as compared with $20.45; and on the 36 by 4, the new price is $42.75 against $37.15. On its puncture-proof non-skid type, some of the advances range from $3 to approximately $7, as on the 36 by 4, which has gone up to $47.15 from $40.95.

Michelin plain tread prices on a few of its popular-sized tires are as follows: 32 by 4, new price $23.40, old price $20.95; 33 by 4, new price $23.90, old price $21.50, and 36 by 4, new price $26.30, old price $23.75. On its non-skid or Universal type, the prices are as follows: 32 by 4, new price $24.90, old price $22; 33 by 4, new price $25.65, old price $22.50, and 36 by 4, new price $27.95, old price $24.75.

Within the past week Firestone has increased its truck tire prices another 10 per cent. This is in addition to the 10 per cent increase announced earlier.

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Chalmers Plans Canadian Plant

DETROIT, MICH., Jan. 31—Another local automobile company has decided to start manufacturing in Canada. It is the Chalmers Motor Co., and a Canadian Chalmers company has been incorporated under the laws of Ontario with a capital stock of $1,000,000.

A plant will be erected either in Windsor or Walkerville. The reason for this action, according to Vice-President Clarence A. Pfeffer, is that the tariffs or customs duty on automobiles and parts are becoming prohibitive to American manufacturers, and that the only way to do business profitably in the Dominion is to establish a manufacturing plant there.

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Willis Is Chalmers Sales Manager

DETROIT, MICH., Feb. 1—Frank B. Willis, who was assistant sales manager of the Chalmers Motor Co., has been promoted to sales manager by vice-president of the selling division Paul Smith. Mr. Willis has been with the Chalmers company for one and a half years, being district manager for the company for the Eastern district at the time he was called here to the factory.

Two other promotions in the Chalmers sales division are those of T. H. Smith and W. J. Drumpelman, special representatives who become assistant sales managers.

12,000 Carloads Shipped in Jan.

N.A.C.C. Traffic Dept. Reports —Expects 16,000 Carload Shipments in February

NEW YORK CITY, Feb. 1—Reports from the N. A. C. C. traffic department give some idea of the increased production of motor cars during the month of January. During the first three weeks of the month members of the Chamber shipped 12,000 carloads of motor cars, and it is expected 16,000 will be shipped during the month. Last year only 8300 cars were shipped during the entire month. In other words, shipments have practically doubled. This greatly increased production is naturally handicapping railroads which have not enough freight cars to take care of the requirements. The work the Chamber is accomplishing is demonstrated by the fact that such railroads as the Santa Fé are hauling complete trainloads of empty automobile cars from California and Texas in order to get them back to the factories as soon as possible. Ordinarily these freight cars would be held and brought back loaded. Many of the factories are being regularly held up on shipments, several not having available railroad cars to take care of more than 75 per cent of their daily production.

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75,000 Maxwells for 1916

DETROIT, MICH., Jan. 31—Production facilities of the Maxwell Motor Co. have now reached a stage where considerably more than the output of 60,000 cars planned for the fiscal year 1916 will be made. Officials say that they expect 75,000 cars to be made by the end of July, 1916, and that in the enlarged plant an annual output of over 100,000 is possible.

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Maxwell to Have Canadian Plant

DETROIT, MICH., Jan. 31—Maxwell cars are to be made in Canada within the next few months, according to Walter E. Flanders, president of the Maxwell Motor Co. They will be made in a large plant to be erected in Windsor, Ont.

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Chicago May Have Truck Show

CHICAGO, ILL., Feb. 1—During the Chicago Coliseum Motor Show last week a movement started looking toward the possibility of a motor truck show to be held in Chicago next year during the week of the passenger car show. Six or seven different representative manufacturers met and formally discussed the question, and a committee of one was appointed to take up with the truck manufacturers their attitude on such an exposition.

94,437 Overlands Built in 1915

Increase of 45,969 Over Output During 1914—722 in Day is Record

TOLEDO, OHIO, Feb. 2—The Willys-Overland Co. made and sold 94,437 Overland cars in 1915. This is at the rate of 315 per day on the basis of 300 working days.

In 1914 the number of cars made was 48,468, or at the rate of 161 per day during 300 working days.

The increase during the past year was 45,969, or nearly double the 1914 output.

The way production is now going on even the great record of 1915 will be far outdistanced, as production is now already at the rate of more than 700 cars a day, the record to date being 722 in twenty-four hours.

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Congressman Calls for Investigation of S. O. Companies' Methods

WASHINGTON, D. C., Feb. 1—*Special Telegram*—A board investigation to determine primarily whether or not the segregated Standard Oil companies are boosting the price of gasoline was proposed to the House in a resolution introduced by Representative Dowell of Iowa.

The resolution proposed a general inquiry into the production, transportation, refining and marketing of gasoline and other petroleum products to lay bare the causes for the recent advances in the prices of these commodities.

Dowell's resolution calls for the appointment of a select committee to be appointed by the Speaker of the House and to consist of nine members.

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Permanent Automobile and Accessory Showroom for Wall Street

NEW YORK CITY, Jan. 29—Taking advantage of the recent boom in war stocks during which many fortunes were made by curb brokers and others connected with the Wall Street section, R. J. Adams, Edwin Robins, and W. T. Savage have leased 15,000 sq. ft. at 50 Broad Street, on the ground floor, where they will establish a permanent showroom for automobiles and accessories.

It is stated that this section of the city at the present time abounds in many opportunities for sales in automobiles and accessories. It is expected that about twenty-five automobile manufacturers will be represented at the showroom and an equal number of accessory makers will show their wares. Up to the present time the following automobile makers have inquired for space: White, Apperson, Stutz, Packard, Overland, Pierce-Arrow, Mitchell, Mercer, Studebaker and Cole.

The delay in shipping conditions has held up the opening of the exhibition, but it is expected that by Feb. 15 enough of the new cars will be on hand to warrant a general opening on that date.

Messrs. Johnson and Dimond of the White and Apperson companies have been largely instrumental in the planning of this new venture. Though no company has as yet been formed, it is stated that a holding concern will be organized in the near future under the name of the 50 Broad Street Exhibition and Salesroom Co., with Edwin Robins, president and W. T. Savage, secretary and general manager. Each automobile maker will have his own salesman on the floor of the showroom.

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Studebaker Declares Extra Dividend

SOUTH BEND, IND., Feb. 1—The directors of the Studebaker Corp. to-day declared a quarterly dividend of 1½ per cent, and an extra dividend of 1 per cent on the common stock; also the regular quarterly dividend of 1¾ per cent on the preferred stock. The dividends are payable March 1 to holders of record Feb. 19. The previous distribution on the common issue was 1½ per cent quarterly and 1 per cent extra.

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Knowles Is Saxon Chief Engineer

DETROIT, MICH., Jan. 29—W. K. Knowles has been appointed chief engineer of the Saxon Motor Car Co., to succeed R. E. Coles, resigned. A. H. DeWees, formerly in charge of the chassis purchasing department of the Packard Motor Car Co., has succeeded R. M. Wirth, resigned, as purchasing agent.

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Gifford with Paige-Detroit

DETROIT, MICH., Jan. 31—R. F. Gifford, who during the past six months was secretary of the Foreign Trade Bureau of the Detroit Board of Commerce, has become connected with the Paige-Detroit Motor Car Co. and will devote his time to building up the foreign business of that company.

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McCrickett, Russel Engineer, Dies

DETROIT, MICH., Jan. 27—Thomas F. McCrickett, who was chief engineer of the Russel Wheel & Foundry Co.; former president of the Detroit Engineering Society and a member of the American Society of Civil Engineers, died Jan. 26.

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Malcolm Co. Has $1,000,000 Capital

DOVER, DEL., Feb. 1—The Malcolm Motor Car Co. has been formed to make and sell automobiles and trucks. Its capital is $1,000,000. The incorporators are F. D. Buck, G. H. Dillman and M. L. Horty of Wilmington, Del.

S. A. E. Council in Session

Committee Chairmen Appointed—Members To Be Approved Feb. 16

CHICAGO, ILL., Jan. 28—One of the most successful meetings of the council of the Society of Automobile Engineers was held in this city to-day, at which practically all of the members attended, including President Huff and Messrs. Van Dervoort, Dunham, Utz, Coombs, Rose, Beecroft, Chase, Foljambe, Hall and General Manager Clarkson.

The meeting was called to complete the general organization of the season, as well as the announcement of the committees appointed by the president. The most important change in the committees was the resignation of K. W. Zimmerschied, chairman of the standards committee, and the appointment of A. Ludlow Clayden, engineering editor of THE AUTOMOBILE, to this position.

President Huff announced the chairmen of various other committees, but the personnel of the different committees was not decided upon. Among the chairmen nominated are the following: Finance, H. M. Swetland, Class Journal Co.; Meetings, George Dunham, consulting engineer, Detroit; Members, R. H. Coombs, Prest-O-Lite Co., Indianapolis; Publications, Herbert Chase, laboratory engineer Automobile Club of America, New York. It is expected that the various members of the different committees will be approved at the next meeting of the council to be held in Detroit, Wednesday, Feb. 16.

Several applicants were approved for membership in the society, these including S. H. Page, assistant engineer, the Union Gas Engine Co., San Francisco, Cal.; Wallace W. Tuttle, factory engineer, Van Blerck Motor Co., Monroe, Mich.; Burns Dick, engineer, Wagner Electric Co., St. Louis; Benjamin F. Schooler, Briscoe Motor Car Co., Jackson; and Watson R. Smith, Jackson Cushion Spring Co., Jackson, Mich.

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Brosseau Federal Truck Vice-President

DETROIT, MICH., Jan. 25—Beginning Feb. 1, A. J. Brosseau becomes vice-president of the Federal Motor Truck Co., of which he has been a director and stockholder. Mr. Brosseau has been general manager of the Gale Mfg. Co., Albion, Mich., for the past twelve years.

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J. C. Wilson Raises Capital

DETROIT, MICH., Jan. 27—The J. C. Wilson Co., which makes the Wilson truck and is also manufacturing tops, has increased its capital stock from $20,000 to $225,000.

Foreign Trade Import and Export Is Serious After-War Problem

Many Interesting Opinions Given at Convention of National Foreign Trade Council—Expedients to Prevent Dumping Discussed from Many Angles

NEW ORLEANS, LA., Jan. 29—The three-day convention of the National Foreign Trade Council, held in this city Thursday, Friday and Saturday of this week, has been one of the most valuable meetings for the consideration of sane problems in connection with foreign trade. Automobile interests have been directly and indirectly represented and all automobile concerns, hoping to develop their export trade, have lost a favorable opportunity of getting closer in touch with foreign business than they have had during the past year. While the convention did not discuss the automobile industry in general, there were many papers presented and discussions carried out that had a direct bearing on the subject.

Team Work Required

The problems of what conditions American manufacturers will face at the conclusion of the war were discussed from many angles. Alba B. Johnson, president of the Baldwin Locomotive Works, declared that a truly foreign trade policy on the part of the United States is necessary to meet conditions after the war. In the words of President Johnson, "It will be necessary for us to learn team work, by which is meant corelation of the efforts of the manufacturer merchant, banker and investor. Hitherto our bankers have been reluctant to enter the field of foreign finance; commission houses have too frequently been free lancers, pushing trade along the lines of least resistance or not in such a way as to create permanent and reliable trade. Our manufacturers have to fight single handed for their foreign trade and it is wonderful how well they have succeeded in view of the conditions of competition which they had to meet."

In referring to the possible trade conditions when the present war is ended, President Johnson said, "When the first peace negotiations begin, the uncompleted portions of all the vast volume of foreign war contracts, which are being executed in this country, will be suspended. Thousands of men will be deprived of employment, numberless inflowing streams of gold and profit will be stopped, and business of every kind will suffer a dislocation. In Europe the return of men now under arms, together with cessation of work on arms and munitions will alike affect the belligerent countries as well as ourselves, and great numbers of men will be forced to seek employment.

"Except in war stocks and automobile finance, there has been no undue financial expansion in this country. A guarantee of safety is to be found in continuing this conservative course. There can be little danger of a shortage of money after the war, because the money now employed as working capital in filling war orders will be released, and because the demands from Europe for war loans will cease. The amount of idle money will be large, until reabsorbed in legitimate enterprises at home and abroad."

The policy of selling merchandise in foreign countries at a lower figure than sold in the home market, a situation which the automobile industry has had to face for several years, was defended by Henry C. Emery, former chairman of the United States tariff board. Mr. Emery declared that selling goods in one market, such as South America, cheaper than in the home market was economically sound and that the United States Government should not hastily adopt any anti-dumping policy which might lead other nations to retaliate against the American foreign trade in manufactures, many of which are sold cheaper abroad than at home.

Dumping Not Sporadic

In his defense Mr. Emery referred to common misconceptions regarding the general policy of manufacturers in selling products lower on the foreign market than on the home market. The practice of dumping, he said, is as old as the world market, and is continuous rather than sporadic. The real danger which threatens us after the European war is not that European manufacturers will sell goods in our market below their own cost production, but that they will sell goods below our cost at home.

After pointing out several common fallacies regarding dumping, and showing that it was a natural and unpreventable form of trading as long as the world markets remained much as at present, Mr. Emery expressed disbelief in the effectiveness of most of the schemes suggested for the prevention of dumping in America after the war. He said that in his opinion the only plan was to institute a "bargaining tariff" scheme adaptable to meet constantly changing conditions. He stated that the foreign manufacturer could often get around an anti-dumping clause of the sort that have met with a good deal of favor, and that the foreign manufacturer would generally prefer a 25 per cent tariff plus an anti-dumping clause to a straight tariff of 35 per cent.

Prices in foreign markets are so low that the American exporter is largely driven by the sheer force of international competition to sell his surplus at some reduction. For this reason, the movement for an anti-dumping law will prove dangerous.

In speaking on this same subject of foreign countries selling abroad at lower prices then at home, M. A. Oudin, manager of the foreign department of the General Electric Co., said that this policy is generally followed out by foreign concerns. Export co-operation on the part of American manufacturers will lower the cost of distribution. The actual situation confronting American exporters is that there exists on our statute books federal laws which prohibit co-operation, although intended solely for the prosecution of the export trade of this country. In other words, the existing anti-trust laws enacted primarily for the benefit of the domestic consumer, by prohibiting monopoly and restraint of trade, and by increasing competition between manufacturers and producers at home, are equally applied to the regulation of our foreign commerce.

The net results are an impaired efficiency of our exporting methods and the creation of destructive competition among American manufacturers in their foreign trade. The foreign buyer is favored by frequently obtaining unnecessarily low prices; the American exporter is often injured by losses in his business, and finally our competitors have a freer field in which to operate.

Co-operation Helpful

Co-operation among manufacturers selling small articles such as automobile accessories in foreign fields was advocated by H. C. Lewis, general manager, National Paper and Type Co., New York. He referred to small accessories manufactured by a number of different manufacturers, none of which may be in sufficient demand to warrant the establishment of individual selling agencies, and all of which must meet with keen foreign competition. Such articles of constant consumption, sold at low prices, and at small profit, with prompt and regular deliveries must be the ultimate basis of the great and permanent foreign business which is desired.

Speaking on this Mr. Lewis said: "To sell our staple articles abroad and with profit requires the greatest possible efficiency and economy of operation. Competition among ourselves will necessarily increase expense and reduce profits, while co-operation in the proper spirit

will give us larger business and increased profits. It must be recognized that an efficient selling organization can only be maintained at great expense, and that it must have the benefit of substantial capital to perform its functions. A small organization is not only less efficient but it necessarily has greater difficulty in raising capital needed. We are a big country and we need big business organizations to represent us abroad."

Speaking on this same subject of co-operation of smaller manufacturers in pursuing their export trade, L. S. Smith of the American Laundry Machine Co., Cincinnati, was convinced that the smaller American manufacturers should be allowed to combine to create a demand for their products in the foreign market. The smaller manufacturer will be at a decided disadvantage so long as we have to depend on the carrying of our cargoes by steamship companies owned in countries which are our most active rivals.

Gilbert H. Montague, counsellor at law, New York City, drew a vivid picture of the handicap which American manufacturers are working under because the present laws do not afford co-operation among manufacturers, with the result that American exporters are competing among themselves in foreign markets, whereas the great object should be co-operation among themselves and competition against other countries.

Here is Mr. Montague's picture: "Imagine a squad of recruits responding patriotically to the country's call for the foreign service, paying out of their own pockets for their equipment and training, studying in solitude the use of their equipment, with no assistance from the government except a correspondence course of instruction, being sent to the front with the plaudits and best wishes of their grateful country, and with a warning that if they ever fight or even drill as a co-ordinated army, or in any way accept as unrelated individuals, they will be liable when they return home to court martial and public disgrace. That is the position of our exporter to-day."

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Purchasing Agents Assn. Formed

DETROIT, MICH., Jan. 26—The Purchasing Agents Assn. has been formed here, the members being purchasing agents in local manufacturing concerns. its object is both business and social. Dinners and meetings are to be arranged at which matters concerning the agents' duties and business will be discussed, such as good management of purchasing departments, scientific buying and co-operation with salesmen.

The officers elected are: P. E. Stroup, Dodge Bros., chairman; T. W. Tracy, Paige-Detroit Motor Car Co., vice-chairman; T. F. Thornton, Detroit Steel Products Co., secretary; F. W. Boynton, Packard Motor Car Co., treasurer.

Ford Detroit Plant to Be Doubled Within the Next Two Years

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$10,000,000 to Be Spent on Buildings and Equipment in That Time—Output of 1,000,000 to 1,500,000 Cars a Year Is Plan—Payroll Will Approximate 100,000

DETROIT, MICH., Jan. 27—Ten million dollars, possibly a little less, probably a little more, will be expended by the Ford Motor Co., in doubling its plant here. The erection of duplicates of most of the present buildings is part of the plan, while many of the structures of the present factory will be considerably extended. New buildings and additions will cost probably more than $2,000,000, and for new machinery, tools and equipment in general, an expenditure of from $6,000,000 to $8,000,00 is expected.

If the water problem, about which the village of Highland Park must first be consulted, is solved satisfactorily, and a duplicate of the present, as yet unfinished power plant is put up, it will mean an additional expense of at least $1,800,000 which is not considered in the above figures. A working force of at least 60,000 men, and very likely 75,000 will be on the company's payroll when the revised and modernized Ford plant is in full operation. An output of not less than 1,000,000 Ford cars annually and more likely 1,500,000 will, according to officials, be a fact within a few years.

This factory extension program is entirely independent from the big Ford plants to be put up in the River Rouge and Dearborn districts where the Ford tractor plant, the steel mills and possibly the tire plant are to be located, which will require another army of at least 25,000.

Plan Well Matured

As was reported in THE AUTOMOBILE during the past year whenever purchases of land or property had been announced by the Ford company, they were the beginning of this contemplated enlargement plan. These plans might have been announced several months ago had it not been for several acres of land adjacent to the present Ford plant, concerning which negotiations had been going on for a very long time, and which were absolutely necessary to make the Ford project a possibility. These few acres of land were finally bought last December and the documents were duly signed only recently so that no announcement was possible until this matter had been settled.

The most important feature in connection with the new buildings will be the erection of a foundry in which castings for an output of at least 5000 Ford cars per day will be made.

The architects and draftsmen are still working on the plans for the many new structures, and information is thus only of a general nature at present.

The first new building to be started will be a duplicate of a six-story structure, 245 by 945 ft. on Manchester Avenue, this addition being rather an extension to this structure, its total length will thus be 1890 ft. At the end of this avenue, right near the boundary line of the Ford plant's property, another six-story building, 245 by 945 ft. is to be erected. On the Woodward Avenue side of the Ford plant, the factory building right behind the general office building, is to be extended 800 ft. to the north, giving the plant a width of about 1650 ft. on the avenue. In front of this factory extension there will be a duplicate general office building, four stories high. All the present one-story shops which extend hundreds of feet into the yards are to be enlarged so that their total length will probably be about 1650 ft., and all will be made into four-story buildings.

Price to Be Cut

Although Henry Ford did not say that there will be a great reduction in the price of the Ford car when the new plant is in operation, he let it be known in a roundabout way that the new manufacturing system, the increased production, the purchase of larger quantities of materials and other necessities, will contribute in reducing manufacturing cost and that both the company and the Ford purchaser will benefit by it.

Just how much land Mr. Ford or the Ford Motor Co. purchased in recent years is not known to outsiders. It is estimated that land purchased within the vicinity of the present parent plant totals more than 200 acres, the last of the purchases being made in December, 1915, consisting of about twenty acres and costing, it is said, about $500,000. In March, 1915, the Ford company purchased 56.7 acres of land on Woodward Avenue, almost directly opposite its plant, from the Chevrolet Motor Co., the price paid being, it is said, $580,000. Other purchases were made, it is claimed, in the vicinity. In an entirely different section of the city, or rather far from the Highland Park plant, between 700 and 1000 acres of land were purchased last year for the new steel mills, tractor plant, tire plant and workmen's city.

November Exports Are $8,322,601

5243 Cars and Trucks Shipped Abroad—1553 Trucks and 3690 Passenger Cars

WASHINGTON, D. C., Feb. 1—The tremendous increase in the export trade in automobiles in November last as compared with the corresponding month of 1914 is vividly shown in the figures just released by the statistical bureau of the Department of Commerce. Looking over the figures one finds that in November last 1553 commercial cars, valued at $3,837,307, were shipped abroad, while in November, 1914, the number was 842, and the value $2,244,518.

The passenger cars exports in November last amounted to 3690 cars, valued at $2,791,507, while in November, 1914, the number was 776, and the value $634,659. The exports of parts, not including engines and tires, amounted to $352,567 in November, 1914, and to $1,693,787 in November last.

These are the figures for the eleven months' period of 1915: Commercial cars, 20,418, valued at $55,913,713; passenger cars, 38,205, valued at $32,334,734; parts, not including engines and tires, $14,508,596. For the corresponding period of 1914 the figures are: Commercial cars, 2151, valued at $5,598,027; passenger cars, 21,038, valued at $18,523,010; parts, not including engines and tires, $5,208,090. The exports by countries are shown in the accompanying tabulation.

McLean Tire Elects Officers

CLEVELAND, OHIO, Jan. 31—The organization of the McLean Tire & Rubber Co. was completed Saturday by the election of the following officers: President, J. C. McLean; vice-president, W. B. Davis; secretary, G. W. Stewart; treasurer and general manager, T. J. Holmden. Most of the men interested in the new company are connected with the M. & M. Co., wholesale and retail dealer in accessories.

The old Morgan & Marshall Tire & Rubber Co.'s plant at East Liverpool, Ohio, purchased some time ago by the new company, will be put into operation about Feb. 15, with G. W. Greene as factory manager. It is the intention of the management to turn out about 500 complete tires per day.

R. S. Drake, Formerly Editor of "Motor World," Dies

NEW YORK CITY, Jan. 29—Roy Stannard Drake, editor of *Automobile Topics*, died yesterday morning at his home in this city of pneumonia. He was born in Cleveland and was in his thirty-sixth year. His activities in automobile journalism followed some years of work for the Cleveland *Plain Dealer*, Cleveland *Press* and the Washington *Press*, where he reported Senate affairs.

Mr. Drake later joined the advertising department of the Winton Motor Car Co., Cleveland, and following this connection he became advertising manager for the Post & Lester Co., Hartford, Conn. His automobile journalistic career began when he joined the editorial department of the *Motor World*, this city. Afterward he became editor of the *Bicycling World*. When *Automobile Topics* was purchased by F. W. Roche, Mr. Drake became its editor. He is survived by his mother and an aunt.

Packard to Boost Citizens Only

DETROIT, MICH., Jan. 31—Beginning to-day the cosmopolitan population of workers within the plant of the Packard Motor Car Co. is being told through posters and hand bills that their future advancement or promotion to any position of responsibility or trust, in fact, practically any kind of better position than that of mere factory or shop worker, will depend first of all as to whether they are or have started to become American citizens.

83,128 Cars in Canada

1915 Registration 22,070 More Cars Than in 1914—Ontario Has 36,300

OTTAWA, ONT., Jan. 31—Registrations in Canada up to Nov. 9, 1915, amounted to 83,128, or 22,070 more than those registered in the same period in 1914, which was 61,058. This is an increase of 36 per cent. Ontario leads with 36,300 with Saskatchewan second, having 11,966. Toronto leads in the cities, registrations with 8815, and Montreal second, having 3917. Vancouver is a close third with 3719.

Last year Ontario also led with 25,020 followed by Saskatchewan with 8415 and Manitoba with 7148.

Provinces	1914	1915
Alberta	4,268	5,192
British Columbia	6,387	9,100
Manitoba	7,148	7,841
New Brunswick	1,269	1,941
Nova Scotia	1,701	2,435
Ontario	25,020	36,300
Quebec	6,850	8,383
Saskatchewan	8,415	11,966
Total	61,058	83,128

New Knox Tractor at $5,000

SPRINGFIELD, MASS., Jan. 31—The Knox Motors Associates have produced an entirely new type of Knox tractor, although mechanically it is practically identical with the standard chassis. The new tractor is designed to operate as an independent unit, to haul four-wheeled trailers and is equipped with a winch of exceptional power. The new product is called the Knox towing winch tractor, and is intended, according to the Knox company, for special service, such as pulling loads of lumber up onto trailers, subsequently to be hauled by the tractor, where the tractor may not only haul heavy loads of equipment, but with its winch assist in erecting the big tops. It is especially adapted to application where the roads are unusually

Exports of Automobiles, Trucks, Parts and Tires for November and 11 Previous Months

	November				Eleven months ending November			
	1914		1915		1914		1915	
	Number	Value	Number	Value	Number	Value	Number	Value
Commercial	842	$2,244,518	1,553	$3,837,307	2,151	$5,598,027	20,418	$55,913,713
Passenger	776	634,659	3,690	2,791,507	21,038	18,523,010	38,205	32,334,734
	1,618	$2,879,177	5,243	$6,628,814	23,189	$24,121,037	58,623	$88,248,447
Parts (not including engines and tires)	.....	352,567	.....	1,693,787	.....	5,208,090	.....	14,508,596
Total	.....	$3,231,744	.....	$8,322,601	.....	$29,329,127	.....	$102,757,043
BY COUNTRIES								
France	695	$1,714,145	698	$1,848,965	1,847	$2,510,830	5,881	14,887,732
Germany	.....	.....	.....	.....	1,063	799,552	4	2,800
Italy	2	8,360	16	9,973	235	160,058	226	144,874
United Kingdom	404	683,496	1,534	1,706,832	5,949	5,794,504	22,989	33,086,049
Other Europe	22	24,256	520	1,054,410	2,758	3,381,664	8,022	21,057,550
Canada	105	133,103	210	209,684	4,086	5,158,081	5,448	4,363,821
Mexico	8	14,300	21	18,261	81	101,684	109	102,402
West Indies and Bermuda	84	63,004	315	201,808	550	457,346	2,940	1,680,168
South America	100	47,380	322	221,252	1,063	822,884	2,786	1,498,578
British Oceana	115	113,638	832	662,124	3,190	2,732,850	4,426	3,703,976
Asia and other Oceana	67	69,428	491	491,891	1,362	1,309,764	3,736	5,965,892
Other countries	16	8,067	284	203,614	1,005	891,820	2,056	1,754,605
Total	1,618	$2,879,177	5,243	$6,628,814	23,189	$24,121,037	58,623	$88,248,447

bad, so that with wheel traction alone the vehicle is apt to become mired, when the winch may be used to extricate it.

It has a very large sprag which is intended to be dropped when the winch, which is placed on the rear deck, is in use. Between the cab and the winch there is a short body designed to carry a load up to 3 tons to aid in securing traction. The usual Knox spring suspension is departed from, since the frame extends back as in an ordinary truck and is suspended on half elliptics.

It may be equipped with either standard wood wheels and dual solid tires or with steel wheels with diagonal lugged treads. It is priced at $5,000, f.o.b. Springfield.

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Chalmers 6-40 to Sell for $1,450 After March 1

DETROIT, MICH., Jan. 26—Because it now costs $118.22 more in raw material to build the Chalmers 6-40, the Chalmers Motor Co. decided to-day that the price of this model, which now is $1,350 f.o.b. Detroit, will be $1,450 beginning March 1. All orders received up to midnight, Feb. 29, will be filled at the old price, or $1,350.

To illustrate the increase in price of materials the Chalmers company says that high-speed steel which formerly cost $1.05 per pound is now quoted at $3.35 per pound. Vanadium steel which sold at $1.85 per pound a year ago now costs $8.50 per pound. Aluminum selling at 19 cents per pound three months ago is now quoted at 53 cents; copper has nearly doubled in price, selling at 24 cents or more now as against 14 cents per pound some time ago. Leather, which formerly cost 20 cents per foot, has been selling at 33 cents per foot, etc.

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Harroun to Make Aero Motors

CHICAGO, Jan. 31—Ray Harroun, who has been identified with the motor car industry as a race driver, inventor of a kerosene carbureter and chief engineer of the Maxwell Motor Co., is about to put his versatility to a further test. During the week of the Chicago motor show, Harroun announced that he had severed his connections with the Maxwell company, with which he has been identified for the past two years, and that he would open a shop in Detroit where he will develop and ultimately manufacture on a commercial basis a popular-priced aviation motor. Richard Miles, who has been assistant to Harroun on the Maxwell staff, succeeds him in the position of chief engineer.

In addition to his aviation motor work, Harroun will construct a special racing car that he guarantees will cover a lap of a 2-mile speedway in less than 1 min. It will be a stunt car and not eligible for the regular speedway events, having a piston displacement of over 300 cu. in.

Liberty Motor Car Co. Incorporated

Secures Plant of R-C-H Co.—Percy Owen President and General Manager

DETROIT, MICH., Feb. 1—Several men of prominence in the motor car industry here have incorporated the Liberty Motor Car Co. with a capital stock of $400,000 to manufacture a low-priced car. Negotiations have progressed to the extent of securing the plant formerly occupied by the R-C-H Corp.

Percy Owen, who until recently was vice-president and sales manager of the Saxon company, and prior to that held the position of general sales manager with the Chalmers company, heads the new Liberty organization, and is also the general manager, and he has associated with him James F. Bourquin as vice-president. The latter was formerly general manager of the Paige-Detroit company and previously was superintendent of manufacturing of the Chalmers company. The Liberty engineer is R. E. Cole, who was the Saxon engineer, and H. M. Wirth, also a former Saxon man in the capacity of purchasing agent, will have similar duties with the Liberty. There are said to be several other men well known in the trade interested in the new concern.

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Goodrich Statement Shows Good Profits—Officers Elected

AKRON, OHIO, Jan. 29—The directors of the B. F. Goodrich Co. at their annual meeting yesterday declared a quarterly dividend of 1 per cent on the common stock, payable Feb. 15 to stock of record Feb. 5 and a dividend of 3½ per cent on preferred, payable 1¾ per cent on April 1 to stock of record March 21, and 1¾ per cent on July 1 to stock of record June 20. No dividend has been paid on Goodrich common since the close of 1912.

B. G. Works was re-elected president of the corporation, W. O. Rutherford, formerly assistant sales manager, goes up a step higher, being made sales manager, succeeding H. E. Raymond, who becomes a vice-president. Mr. Raymond's position as second vice-president was abolished and he becomes a vice-president. He will continue in charge of sales, advertising and selling policy. The office of general manager, held by A. H. Marks, has also been abolished and he becomes a vice-president, but retains his duties as works manager. The duties of Mr. Marks are confined to general supervision of costing, compounding, development and construction. E. C. Shaw, formerly second vice-president, becomes another of the vice-presidents.

The net profits for 1915, after making proper provision for maintenance, charges, depreciation, bad debts and other items, amounted to approximately $12,200,000. This amount, added to the surplus carried over as of Dec. 31, 1914, of $3,100,000, shows undivided profits of approximately $10,500,000 after deducting the four quarterly dividends of 1¾ per cent on preferred stock outstanding, together with a provision of $1,100,000 for the redemption of preferred stock, and a further amount of $1,700,000 set aside for various reserves, which are shown in detail in the annual report.

In its statement the company claims an improvement during the past year in its financial position, as the amount of quick assets over current liabilities shows a gain of approximately $8,100,000. The current assets amount to approximately $31,250,000, and the current liabilities to $4,200,000.

The directors voted to retire 7000 shares of preferred stock prior to July 1, 1916. This makes a total retirement of 27,000 shares, covering the charter provision for retirement of preferred stock up to July 1, 1916. In regard to its sales in 1915 the company states: "While the directors are highly gratified over the results of 1915, they have taken into consideration that a part of the increased earnings for the year were due to causes which may not be permanent.

The preliminary statement appears herewith.

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Knight Re-elected President

CANTON, OHIO—J. F. Knight was re-elected president of the Knight Tire & Rubber Co. at its annual meeting, held recently.

C. H. Knight was re-elected treasurer and C. T. Carlson was re-elected secretary. The balance of the board members remains the same as last year with the exception of Howard Fawcett, who was elected a director.

B. F. Goodrich Co.'s Preliminary Statement for 1914 and 1915

	1915	1914	Changes	
Net profits	*$12,200,000	$5,440,427	Inc.	$6,759,573
Preferred dividends	2,000,000	2,068,500	Dec.	68,500
Balance	$10,200,000	$3,371,927	Inc.	$6,828,073
Per cent on common stock	17.00	5.62	Inc.	11.38
Preferred stock redemption	1,100,000	900,000	Inc.	200,000
Various reserves	1,700,000	.....	Inc.	1,700,000
Previous surplus	3,100,000	705,982	Inc.	2,394,018
Total surplus	$10,500,000	$3,177,910	Inc.	$7,322,090

*Approximately.

F. W. D. Capital To Be $500,000

Increase from $250,000—100% Stock and 30% Cash Dividends

CLINTONVILLE, WIS., Jan. 31—Prosperous conditions were reflected in the annual report made to stockholders of the Four Wheel Drive Automobile Co., Clintonville, Wis. Although more than $100,000 was invested in buildings, additions and equipment during 1915, the company declared a stock dividend of 100 per cent and a cash dividend of 30 per cent. The capital stock is to be increased at once from $250,000 to $500,000, and the additional issue distributed among present stockholders. The 30 per cent cash dividend is based on a capitalization of $250,000. The Four Wheel Drive company now has an investment of approximately $200,000. A large amount has been set aside for further purchases of equipment and additions as necessary.

At the annual meeting, W. A. Holt, Oconto; A. W. Priest, Appleton, and J. Kalmes, Clintonville, were re-elected directors. Officers were re-elected as follows: President, W. A. Olen; vice-president, John Kalmes; treasurer, David Rohrer; secretary, Frank Gause. The directors presented a check for $1,000 to President Olen as an appreciation of his services during the past year.

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Another Price Control Bill

WASHINGTON, D. C., Jan. 29—Accessory dealers will be interested in a bill introduced in Congress by Senator Ashurst of Arizona to protect the public against dishonest advertising and false pretenses in merchandising. One provision of the bill is that in any contract of sale by a producer of articles to any wholesale or retail dealer, where the contract constitutes interstate commerce, the producer shall have the right to prescribe the uniform prices and manner of settlement at which the different qualities and quantities of each article covered by the contract may be sold. Special provision is made, however, against monopoly or the control of the market for articles belonging to the same general class. The producer or vendor must file with the federal trade commission a statement regarding his contracts for sale and the scale of prices, and he must pay a fee of $10 for registration of such contracts with the commission. The bill was referred to the committee on interstate commerce.

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Four Shares Chevrolet Equals One General Motors

NEW YORK CITY, Jan. 29—The Chevrolet-General Motors Syndicate announces that the offer of exchange on the basis of five shares of Chevrolet for one share of General Motors common was closed on Jan. 25. Offerings will be considered hereafter at not to exceed four shares of Chevrolet for one share of General Motors common. General Motors common is earning about $140 per share, and Chevrolet at the rate of $25. The additional Chevrolet shares which will be issued will pass into the strong interests which at present control General Motors, and little, it is stated, is likely to find its way to the market.

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Republic Tire Prospers

YOUNGSTOWN, OHIO, Jan. 28—Republic tire sales increased 69 per cent in 1915 over the previous year, according to a report from the Republic Rubber Co., this city, which held its fifteenth annual meeting last week. Taking all departments into consideration, the company had more business on its books Jan. 24 than on any date in its history and prospects are good. The usual cash dividends at regular rates were declared. The old officers were re-elected as follows:

President, T. L. Robinson; vice-presidents, L. T. Petersen and J. H. Kelly; secretary, C. F. Garrison; treasurer, M. I. Arms, 2nd.

There were two additions to the board of directors, as follows: H. M. Garlick, president of the Standard Oil Cloth Co., and R. E. Cornelius, president of the Mahoning National Bank.

David Tod, who has been on the board for some years was not re-elected, at his own request. The board of directors is as follows:

M. I. Arms, Robert Bentley, C. H. Booth, J. H. Kelly, L. T. Petersen, T. L. Robinson, John Tod, H. K. Wick, J. C. Wick, H. M. Garlick and R. E. Cornelius.

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Rubber Prices Are Lower

NEW YORK CITY, Feb. 1—Tire prices are higher, while crude rubber quotations are lower. Yesterday fine up-river Para dropped 6 cents a pound to 73, as did Ceylon, first latex pale crepe, which closed at 75. The market as a whole is weak and quiet. Prices have fallen sharply from the recent high level, but manufacturers show no disposition to purchase any more than they are compelled to. A considerable increase in the arrivals of crude rubber was reported last week, and in the absence of any improvement in the demand the market weakened.

Notwithstanding the rise of 1 cent a pound in copper yesterday, the producers were not inclined to sell, as higher prices, it is stated, are in view. Lead has risen to $6.15 per 100 lb., and predictions are made that it will advance to $6.25 before the end of the week. Aluminum remained constant throughout the week at 53 cents a pound.

Steel prices remained unchanged. It is stated that automobile manufacturers are holding off orders under the present quotations. Bessemer is quoting at $32 a ton, while open-hearth is at $33. The makers are fighting for lower quotations. It is said that contracts placed last year by the automobile builders were exceptionally large, and some of this stock will tide them over.

A rise in petroleum again occurred last week. On Wednesday Kansas crude rose 5 cents a barrel to $1.30, and on Friday Pennsylvania crude rose 10 cents a barrel to $2.35. Gasoline prices are still quoting at 22 cents.

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Sterling Motor Capital $705,000

DETROIT, MICH., Jan. 29—The Sterling Motor Co., which makes the Sterling four and eight-cylinder motors, has increased its capital stock from $310,000 to $705,000.

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Ford Opens Sales Convention

DETROIT, MICH., Jan. 31—The most important convention of assembling, service and sales branch managers and assistant managers of the Ford Motor Co., began to-day at the parent plant. It is expected that about 100 or nearly

Daily Market Reports for the Past Week

Material	Tues.	Wed.	Thur.	Fri.	Sat.	Mon.	Week's Ch'ge
Aluminum	.53	.53	.53	.53	.53	.53	...
Antimony	.42½	.42½	.42½	.42½	.42½	.42½	...
Beams and Channels, 100 lb.	2.17	2.17	2.17	2.17	2.17	2.17	...
Bessemer Steel, ton	32.00	32.00	32.00	32.00	32.00	32.00	...
Copper, Elec., lb.	.25	.25	.25	.25	.25	.26	+ .01
Copper, Lake, lb.	.25	.25	.25	.25	.25	.26	+ .01
Cottonseed Oil, bbl.	9.50	9.20	9.15	9.18	9.17	9.15	— .35
Cyanide Potash, lb.	.28	.28	.28	.28	.28	.28	...
Fish Oil, Menhaden, Brown	.51	.51	.51	.51	.51	.51	...
Gasoline, Auto, bbl.	.22	.22	.22	.22	.22	.22	...
Lard Oil, prime	.94	.94	.94	.94	.94	.94	...
Lead, 100 lb.	6.10	6.10	6.10	6.10	6.10	6.15	+ .05
Linseed Oil	.73	.74	.74	.74	.74	.74	...
Open-Hearth Steel, ton	33.00	33.00	33.00	33.00	33.00	33.00	...
Petroleum, bbl., Kansas, crude	1.25	1.30	1.30	1.30	1.30	1.30	+ .05
Petroleum, bbl., Pennsylvania, crude	2.25	2.25	2.25	2.35	2.35	2.35	+ .10
Rapeseed Oil, refined	1.00	1.00	1.00	1.00	1.00	1.00	...
Rubber, Fine Up-River, Para	.82	.79	.78	.79	.79	.73	— .09
Ceylon, First Latex Pale Crepe	.88	.87	.80	.81	.81	.75	— .13
Sulphuric Acid, 60 Baume	2.00	2.00	2.00	2.00	2.00	2.00	...
Tin, 100 lb.	42.38	42.00	41.88	41.75	41.75	41.88	—.50
Tire Scrap	.05¾	.05¾	.05¾	.05¾	.05¾	.05¾	...

all of the higher officials having charge of sales and service of the Ford company throughout the country will take part in the week's proceedings.

There will be addresses, talks and discussions, on every subject which has some bearing on the Ford business. The men will be given particulars about the project of enlarging the plant, the question of increased output, the situation of the trade in general. The views of the branch mangers will have much to do with possible changes in selling policies, service matters, etc.

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Maccar Directors Elected

SCRANTON, PA., Jan. 31—The annual meeting of the Maccar Auto Co., this city, was held yesterday, at which the following directors were elected: Worthington Scranton, C. H. Genter, Oscar Kleeman, A. B. Warman, W. E. Bittenbender, George Stevens, W. M. Gardner, W. A. Christ, E. S. Williams, P. L. Sylvester and L. M. Connell, who acted as secretary of the meeting.

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New Starter Co. Formed

GRAND RAPIDS, MICH., Jan. 31—The Wolverine Starter Co. has been organized here with a capital stock of $10,000. A starting device attachable to any machine will be manufactured. J. Frank Carter, patentee, is president of the company.

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Dividends Declared

Avery Co.; 7 per cent on preferred, payable Feb. 1 to stock of record Jan. 26. This cleans up four accumulated quarterly dividends of 1¾ per cent and leaves back dividends of 5¼ per cent.

Security Prices Drop

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General Motors Goes Down 26 Points—Overland Drops 20 Points—Reo Higher

NEW YORK CITY, Feb. 1—A general decline in automobile and accessory issues occurred in the local Stock Exchange last week. Only a few of the issues showed substantial gains, these being Reo truck and car, with gains of 3¼ and 1½ points respectively, and Miller Rubber common, with 10 points. The rest of the gains were for the most part fractional.

General Motors Weak

The declines ranged from 1 to 26 points. General Motors, after showing a flash in the pan last week with a 21-point gain, dropped this week 26 points. Chevrolet sympathetically dropped with General Motors 7 points to 125. Maxwell was steady during the week. Studebaker common dropped 8¾ points. Willys-Overland common dropped 20 points. Incidentally this stock, after reaching a high mark of 268 in 1915, has shown no further tendencies to rise, but has gradually gone down, after the announcement of a new stock issue for the Studebaker company. Shortly afterward came the announcement of a new issue of Overland preferred stock. At the early part of this week the stock went below the 200 mark, or about 69 points below the high mark. Three-quarters of the $15,000,000 issue of convertible 7 per cent cumulative preferred stock has been subscribed for. The balance of the new issue is now being offered to the public at 106 and accrued dividend. These notes are preferred as to both assets and earnings and are redeemable as a whole or in part at the option of the company on 60 days' notice at 110 and accrued dividends on April 1, 1917, or any dividend date thereafter.

The Chalmers company has offered to shareholders the right to subscribe at par to $500,000 new 7 per cent cumulative preferred stock. The company had $2,000,000 preferred stock authorized and $1,500,000 was issued, of which somewhat more than $300,000 had been retired by sinking fund. The offering has been underwritten.

Detroit Exchange Makes Record

Quotations on the Detroit Exchange last week were higher. With the exception of a 22½-point drop in General Motors common and a 6¼-point drop in Studebaker common, the general tone of the market was better than in previous weeks. Continental Motors rose 25 points, as did Packard common.

On the Detroit Stock Exchange all previous sales records were broken Wednesday, when a total of 9850 regularly listed shares of stock, also $13,000 of listed bonds, were sold. Of the 9850 shares which changed hands, 4018 were Reo Motor Truck Co.'s shares, 2780 were Reo Motor Car Co.'s shares and 1585 were Maxwell Motor Co.'s common shares. The active transactions in the Maxwell shares was due to a rumor that a dividend would soon be announced for the Maxwell second preferred stock.

Automobile Securities Quotations on the New York and Detroit Exchanges

	1915 Bid	1915 Asked	1916 Bid	1916 Asked	Wk's Ch'ge
Ajax Rubber Co. (new)	..	..	69½	70	—1¾
Aluminum Castings, pfd	95	100	..	..	..
J. I. Case pfd	79	81	86	88½	..
Chalmers Motor Co. com	..	96	120	150	..
Chalmers Motor Co. pfd	90	93½	100	102	..
Chevrolet Motor Co	..	..	125	126	—7
Electric Storage Battery Co	..	..	61	63	—2
Firestone Tire & Rubber Co. com	370	375	730	..	..
Firestone Tire & Rubber Co. pfd	109	111	112	..	..
General Motors Co. com	92	93	460	480	—26
General Motors Co. pfd	93	95	111½	112¾	—½
B. F. Goodrich Co. com	31½	32	69	70	—2⅛
B. F. Goodrich Co. pfd	114	114½	111½	113	+1½
Goodyear Tire & Rubber Co. com	190	195	337	341	—1
Goodyear Tire & Rubber Co. pfd	101½	103	115½	116½	+1½
International Motor Co. com	..	1	22	26	—1
International Motor Co. pfd	..	10	38	45	..
Kelly-Springfield Tire Co. com	99	101	288	290	—8
Kelly-Springfield Tire Co. com. (new)	..	..	72	73	—2⅝
Kelly-Springfield Tire Co. 1st pfd	82	82½	95	97	..
Kelly-Springfield Tire Co. 2d pfd	115	117	72¼	73	— ½
Maxwell Motor Co. com	17	17⅜	67	69	+ ½
Maxwell Motor Co. 1st pfd	54½	55	87	88	—1¼
Maxwell Motor Co. 2d pfd	20¼	20¾	51½	53	—1½
Miller Rubber Co. com	158	163	270	275	+10
Miller Rubber Co. pfd	102	103	113	115	..
New Departure Mfg. Co. com	..	..	176	182	..
New Departure Mfg. Co. pfd	..	..	111	..	..
Packard Motor Car Co. com	..	100	157	170	—5½
Packard Motor Car Co. pfd	93	..	102½	104½	+ ½
Paige-Detroit Motor Car	..	..	..	700	..
Peerless Motor & Truck Corp	..	..	27	28	—11½
Portage Rubber Co. com	30	36	70	72	..
Portage Rubber Co. pfd	80	85	102	106	..
Regal Motor Co. pfd	..	..	11½	..	..
*Reo Motor Truck Co	12	12¾	28¼	29	+3¼
*Reo Motor Car Co	25	25¾	33½	34½	+1½
Splitdorf Electric Co. pfd	69	71	..	..	..
Stewart-Warner Speed. Corp. com	50	50½	88	90	..
Stewart-Warner Speed. Corp. pfd	100	103	108	..	..
Studebaker Corp. com	40½	41	145	146	—8¾
Studebaker Corp. pfd	93¼	95	110	112	..
Swinehart Tire & Rubber Co	69	71	87	89	..
Texas Co.	131	135	196	198	—13
U. S. Rubber Co. com	56¼	56½	49	51	—5½
U. S. Rubber Co. pfd	101¾	102	106½	108	+ ¾
Vacuum Oil Co	195	198	223	227	—7
White Motor Co. (new)	..	..	50¾	51	+1¼
Willys-Overland Co. com	91	93	201	203½	—20
Willys-Overland Co. pfd	94	96	104½	106	—5½

*Par value $10.

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	1915 Bid	1915 Asked	1916 Bid	1916 Asked	Wk's Ch'ge
Chalmers Motor Co. com	..	94	..	145	..
Chalmers Motor Co. pfd	90	93½	100	102½	..
Continental Motor Co. com	175	200	..	300	+25
Continental Motor Co. pfd	80	..	91	..	..
Ford Motor Co. of Canada	475	..	400	415	+5
General Motors Co. com	92	94	445	475	—22½
General Motors Co. pfd	92½	96	111	114	— ¾
Maxwell Motor Co. com	16	18	66½	69½	+1½
Maxwell Motor Co. 1st pfd	53½	55½	86	89	— ½
Maxwell Motor Co. 2d pfd	20	21	52	55	+1
Packard Motor Car Co. com	..	100	165	..	+5
Packard Motor Car Co. pfd	93	..	..	104½	..
Paige-Detroit Motor Car Co	..	..	..	700	..
*Reo Motor Car Co	24½	25¼	33¾	34½	+1½
*Reo Motor Truck Co	11½	12⅛	27	28	+ ¾
Studebaker Corp. com	41½	43½	146	150	—6¼
Studebaker Corp. pfd	92½	94½	110	114	..

INACTIVE STOCKS

*Atlas Drop Forge Co	..	25	32⅛	..	+ ¾
Kelsey Wheel Co	185	..	300	..	+5
*W. K. Prudden Co	19	19¾	32½	..	— ½
Regal Motor Car Co. pfd	..	25	11½	..	+1½

*Par value $10.

Buffalo Show Indicates Prosperity

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Expanding Industries In and Near Buffalo Foster Strong Demand for Automobiles

BUFFALO, Jan. 28—The show which closed Saturday night was the fourteenth annual affair and was staged by the dealers' association which is composed of some twenty-eight members who represent the cream of the industry in the city. It was strictly a business show and was very largely attended by dealers from Western New York, many of whom brought their prospects with them and closed sales on the floor.

In general, business is in a flourishing condition throughout the Buffalo territory and this is particularly the case in Buffalo itself. As an example in point, industrial deals closed within the past thirty days indicate, on conservative estimates, on four projects alone a total expenditure of nearly $9,000,000 for building operations. During the past five years there have grown in Buffalo an average of ninety-five new industries per year, or 475 for the period. For comparison, the total increase in new industries in Albany, Syracuse and Rochester combined for the same five-year period is given as 128. All this industrial development in Buffalo has taken place since 1910, for, prior to that year, the city gained only twenty-seven new industries per year. Furthermore, this great growth has been solely within the city limits and does not take into account a number of large industrial interests which have located just without the city border.

As indicating the financial importance and buying power of the city, the latest United States census figures are illuminating. The capital invested in 1914 was $243,311,000, a gain of $50,270,000, or 26 per cent, over $193,041,000 in 1909. The value of products is given as $251,103,000 in 1914, as against $218,804,000 in 1909, the increase being $32,299,000 or 14.8 per cent. A comparative summary for the city for 1909 and 1914 is given in the accompanying table.

Bank Deposits High

The purchasing power of the city is well indicated by the bank clearings for the past five years when the total for all banks was $2,825,000,000, an average of $565,000,000 a year. In the preceding five years the average per year was only $411,000,000. The total deposits in Buffalo banks in the past five years has averaged $220,000,000 per year as against $154,000,000 per year for the preceding five years. In other words, the average annual increase in deposits during the past five years has been $66,000,000 as compared with the previous five years.

That portion of New York State which is controlled by Buffalo dealers is an important agricultural center, the principal products being fruit, mixed farming and dairy products. Grain also constitutes a fairly large portion of the State's agricultural productions, though the totals, of course, are not as impressive as those for some of the Western States. A comparison of the productions for the years 1913 and 1914 is given in the accompanying table.

Big Grain Receipts

The total amount of grain receipts coming into Buffalo in 1915 was 210,000,000 bushels. Of this amount 29,641,000 bushels is at present in storage in 100 ships in the harbor. The industrial importance of these grain shipments becomes apparent when it is stated that the item of labor alone for unloading these ships amounts to $1,795,500. Of this amount $745,500 goes directly to labor and the balance to the elevators. Another important feature is that in the spring there will be a total of from 150 to 160 ships in Buffalo harbor which will fit out there at an average outlay of $5,000 per boat, giving a total expenditure of $750,000. This is a conservative estimate in view of the fact that for the past three years ship owners have kept down outfitting expense to the minimum owing to lack of business, but 1915 having been a prosperous year more money will be spent this year.

A Navigation Center

How the importance of Buffalo, as a navigation center, has increased is shown by the fact that the number of ships arriving and departing from the port in 1905 was 8200 with a tonnage of 12,000,000. In 1910 the total number of ships dropped to 7400 but the tonnage went up to 14,000,000. In 1913 there were upwards of 10,000 ships with a tonnage of more than 19,000,000 and in 1915 the number of ships was 7255 and the tonnage had gone up well above 19,000,000.

The average Buffalo dealer covers eight counties in Western New York, including Genesee which, in the majority of cases, is the Eastern boundary. This territory has a total population of 1,008,572 and includes Niagara, 108,419; Erie, 567,347; Chautauqua, 116,575; Cattaraugus, 68,477; Alleghany, 40,216; Wyoming, 33,082, Genesee, 40,296; Orleans, 34,160. Some of the larger distributers have several other counties in addition and in some cases territory extends into Pennsylvania, including several counties across the border.

Buffalo, which is in Erie county, has a population of 454,630, according to the 1915 state census, and population figures have shown a consistent increase as follows:

1865	94,210
1875	134,557
1890	255,654
1892	278,727
1900	352,387
1905	376,587
1910	423,715
1915	454,630

According to the Secretary of State's office, there are at present about 13,250 cars in Buffalo. Registration figures for the 22 counties west of Onondaga show that for 1915 there were 72,874 cars in this territory. Up to Jan. 24, 1916, there had been registered 13,842 cars, and, as compared with the same period last year, this represents a gain of about 33 1/3 per cent.

According to some of the larger distributers, Buffalo dealers are taking cars freely at the present time, though there seems to be some hesitation in some quarters to stocking them during the winter months. This is being overcome, in some cases, by the distributer financing the dealer. One distributer, for example, agrees to carry his dealers for one car for every one they will buy, and this seems to be working out well.

It is stated that the rise in cost of gasoline—the present retail figure in Buffalo is 23 cents—has had a noticeable effect on the used car market, which is described as being very tight. It is hoped that there will be little, if any, effect on the new car market.

Electrics are selling more freely now than has been the case for several years, though the buying is confined almost entirely to pleasure cars. There are very few electric commercial vehicles in use in Buffalo, and there has been little, if any, attempt to push their sales.

One noticeable feature of Buffalo conditions is the marked tendency toward the use of trailers, particularly by the farming communities within a radius of 50 or 60 miles of the city.

Exact figures on the attendance at the show are not available, though it is estimated that the total probably will exceed 60,000 for the week.

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Anderson Returns from Norway

CHICAGO, Jan. 31—Gil Anderson, winner of the Vincent Astor cup race, returned unexpectedly last week from Norway, where he has been for the last two months visiting relatives and touring his native land, and Sweden and Denmark as well. Anderson has made no racing plans for this season and if Harry Stutz sticks to his determination not to compete, the Norseman probably will be a spectator instead of a contender. He is now back at work in the Stutz factory.

To Build Premier Racers

Two Cars to Be Made for Hoosier Speedway Owners —Make Peugeot Parts

INDIANAPOLIS, IND., Feb. 2—The Premier Motor Corp. of this city will build this season two racing cars for the owners of the Indianapolis Speedway.

Although it was announced last week that the local speedway magnates would add two American-built mounts to their stable of four Maxwells and two Peugeots, the Hoosiers at that time refused to reveal the identity of the maker.

The arrangement with the Premier company was made possible by the fact that the concern has just been reorganized and is not ready as yet to start quantity production. Until plans for a manufacturing and merchandising campaign are completed, the company will have sufficient time to work on the special racing jobs.

In addition to building the two new cars, the Premier plant will turn out spare parts for the Peugeots, driven by Howdy Wilcox and Johnny Aitken in the Vincent Astor Cup event at New York in October. Several replacements are to be made in the French mounts before they can be campaigned, and it is impossible to obtain parts in war-ridden Europe.

Tractor Shows for Minneapolis and Kansas City

CHICAGO, ILL., Feb. 1—For the first time agricultural motor implement manufacturers are going to exhibit during the same week of the automobile show in Minneapolis and Kansas City. At Minneapolis a tractor exposition is being held this week across the street from Frederick Murphy's Mitchell agency. In Kansas City the exhibition next week is known as the first annual tractor show and will be staged under a huge tent placed in the Union Station Plaza. In this tent, 365 ft. long and 75 ft. wide, are twenty-six exhibition spaces, all of which have already been taken, and it is expected that thirty different makes of farm tractors will be on exhibition. In addition there will be a good exhibit of accessories for tractors.

The tractor show is being staged by the Tractor Club.

Indiana Service Managers Meet

INDIANAPOLIS, IND., Jan. 31—The midwinter meeting of the Indiana Automobile Service Managers' Association was held at the Severin Hotel Saturday, Jan. 15.

Papers were presented by F. E. Moskovics, commercial manager of the Nordyke & Marmon Co., on The Effect of the Service Department on Eventual Motor Car Design, and by Mr. Fox of the Cole Motor Co. entitled Automobile Electric Systems.

During the business portion of the meeting it was voted to amend the constitution so as to provide for a committee of standards, something along the line of the standards committee of the S. A. E. Three lines of work were recommended:

First, the adoption of a standard form for reporting complaints.

Second, the standardization of the size of information books and parts lists, both of automobile manufacturers and accessory manufacturers, so that the books which go out with the cars shall be of uniform size and shape.

Third, the recommendation to the N. A. C. C. with regard to a system whereby the N. A. C. C. shall make a list of accredited garages throughout the United States for the benefit of motor car manufacturers as well as owners.

The standards committee appointed is as follows: H. W. Cotton, McFarland Motor Co.; Mr. Blywise, Premier Motor Corp.; R. J. Elston, Wescott Motor Car Co.; J. D. Hopper, Remy Electric Co.; G. C. W. Breithwaite, Apperson Automobile Co.

San Francisco Has First Truck Show

SAN FRANCISCO, CAL., Jan. 25—San Francisco's first motor truck show opened to-day. The large Palace ballroom floor space was all taken by northern California truck dealers and factory representatives. Space has been taken by practically every truck now being sold on the Pacific Coast.

Among the power wagons on exhibit is the new Doane truck, a power vehicle of local manufacture which has but recently made its appearance. This truck is a low hung type which has attracted a great deal of attention locally already. The new Golden West Quad designed and built at Sacramento, Cal., is another feature card at the show. This four-wheel-drive and steer commercial car is expected to make great progress in California, where the excellent highways are proving daily the efficiency of the modern motor truck.

The Moreland Distillate truck of Los Angeles manufacture is well represented, a full line being on display. The Moore, built at Torrance, Cal., is also shown at the exhibit. Among the trucks of Eastern manufacture is the Denby, G. M. C., Reo, Dart, Metz, White, Hewitt-Ludlow and others. The railroad companies have granted excursion rates and the truck show is considered a real success. The truck dealers have agreed that if the show is a success, it will become an annual affair.

Shorter Races for Sioux City

300-Mile Contest Replaced by 50 and 100-Mile Events —Prizes $15,000

CHICAGO, ILL., Feb. 2—The 300-mile race, which the Sioux City Speedway Association has promoted for the past two years, will be abandoned this season and two events, one of 100 and the other of 50 miles, will be substituted. There will be no cut in the total prize money, however, as $15,000, the amount hung up last year, will be offered again in 1916.

The Sioux City promoters have come to this decision because they believe that the spectators demand more action than is provided by a 300-mile event.

Sioux City plans to stage two meets for non-professionals later in the season. One meet will be for small cars, such as Ford, Maxwell and others, while the other will be a free-for-all. The races will be run under rules similar to those drafted for the amateur drivers' event to be run on the Chicago speedway May 20.

Stutz in Corona Race

CHICAGO, ILL., Feb. 1—Earl Cooper will drive the fastest of the four Stutz cars, in the Corona grand prize that will be run on the circular asphalt course of the California city March 17.

Although Harry Stutz, the builder of the mounts, announced in the fall that he would not permit any of the cars to compete this season, it became known to-day that Cooper made a secret trip to Indianapolis three weeks ago to secure a Stutz for the Corona race and that he was successful. The car has been overhauled and tuned up and now is en route to the Pacific Coast.

Bob Burman will be another contender at Corona. He arrived from Los Angeles last week to attend the Chicago show. With the assistance of Harry Miller, he has overhauled his Peugeot on the pacific Coast and says that the French car is now in the pink of condition for a hard campaign.

Portland Concludes Successful Show

PORTLAND, ORE., Jan. 29—The seventh annual dealers' show closed here to-night, having been visited by about 20,000 persons during the week. Ninety-one passenger cars were exhibited in addition to a number of trucks and a good range of accessories. Simultaneously with the show, two dealers who had opposed the show idea at its commencement, staged a "salon" at the Multnomah Hotel, exhibiting fifteen passenger cars. As a special attraction they had the original Packard built sixteen years ago.

N. A. T. A. Formed By Dealers

New Body Succeeds Associated Garages of America—Has Strong Financial Plan

CHICAGO, Jan. 27—For the purpose of promoting better conditions in the automobile trade field, the National Automobile Trade Association was formed in this city to-day. Its membership is made up of automobile dealers and garagemen, and it also provides for the membership of those who operate repair shops, automobile machine shops, supply stores, tire stores, tire repair shops, and other similar businesses.

It is a successor to the Associated Garages of America, which was formed a year ago by leaders of the garage trade in Illinois. The latter organization did not move forward rapidly because of a lack of finances; the new organization, however, has a strong financing plan, and with a corps of about twenty organizers, will be able to establish a strong membership in a comparatively short time.

Robert A. Wilson of this city who has been engaged in insurance work has been made Secretary and takes full charge of reorganization. The president is Robert Bland of Evanston, who was elected one year ago to serve two years. The treasurer is F. A. Bean of Detroit.

The Associated Garages of America whose name has just been dropped had a membership of 1420, made up as follows: Iowa Retail Dealers' Association, 800; Garage Owners' Association of Illinois, 300; Garage Owners' Association of Michigan, 150; Garage Owners' Association of Ohio, 100; San Francisco Garage Owners' Protective Association, 70. Aside from these there are throughout the country scores of local and territorial associations which may later become interested in the new national body.

The new association proposes to extend its co-operation to the National Automobile Chamber of Commerce, the Motor and Accessory Manufacturers, the National Association of Automobile Accessory Jobbers, and the various car owner organizations throughout the country, in an effort to promote the best interest of the automobile industry from top to bottom. As a first step in its work the convention to-day was visited by a committee from the jobbers' association. The jobbers and the retail organization discussed one or two points of difference and it was discovered instead of being points of difference they were points of misunderstanding, and harmony prevailed at the close of the conference. Henceforward each organization will have a committee for co-operative work of this kind.

The retail association voted a protest to manufacturers against the practice of selling automobiles to consumers at the dealer's price in localities where the manufacturer has no dealer. This practice is said to be common with several manufacturers and the matter will be taken up with the National Automobile Chamber of Commerce.

Another practice condemned is the appointment of one-car dealers, men who are sold one car, given a dealer's contract, but who never buy any more cars. A vote of thanks was extended to those manufacturers who have announced that they will discontinue bringing out their new models in the middle of the summer. The next national convention will be held in Cincinnati in March, 1917, but in the meantime several State conventions will be held as the organization work progresses.

Newark Stamping Co. in Merger

NEWARK, OHIO, Jan. 29—The Newark Stamping Co., manufacturer of Thompson hose clamps, will merge into a new corporation to be known as the Newark Stamping & Foundry Co., taking over the Moser Pattern & Foundry Co. and the Huffman Plating Works, all of this city. The company will be capitalized at $50,000. It will manufacture accessories, pattern work, casting and plating and polishing and also metal stamping and spinning.

Officers of the company are: Chas. F. Sites, president; Fred W. Moser, vice-president; H. W. Alexander, secretary; E. F. Ball, treasurer and general manager. Mr. Ball has been actively connected with the automobile industry for fifteen years.

New York State Gets Automobile Fines

ALBANY, N. Y., Jan. 31—Fines collected by cities for violation of the motor vehicle act must be turned over to the State, according to a decision handed down Jan. 24 by the Supreme Court Justice, Chester. The cities, may, however, retain money collected in fines and penalties for violations of various city and park board ordinances, so far as they regulate the use of motor vehicles in the city.

The decision is the result of a test case brought by the State against the city of Buffalo.

Safety-First Show for Washington

WASHINGTON, D. C., Jan. 31—There will be a "safety-first" exhibit in which all of the government departments are taking an active part, from Feb. 21-26. Manufacturers and operators from all over the country are invited to be present, in order that they may see what the Government of the United States is doing in "safety-first" work.

Woods Co. Plans Gas-Electric

To Produce Coupe at $2,700—Deliveries by April—Four-Cylinder Engine Used

CHICAGO, ILL., Jan. 30—The Woods Motor Vehicle Co., Chicago, expects to announce next week a car of distinctly new type which combines all the ease of manipulation that has characterized the electrics it has been building for years with the speed and touring radius possibilities of the gasoline car. The combination also permits the dual power plants such that should either system get out of order the car may proceed on the other independently. The combination also is designed to give flexibility.

At the present moment it is expected to produce only the coupé as the first model this will sell at something under $2,700, and deliveries are expected on this by April. That the Woods company expect to produce a quantity of the new car may be taken from the fact that they are coming through the factory in lots of 250 as compared with the lots of 50 in which the present electrics have been produced. The car has been undergoing road tests for a year. The wheelbase is 105 in., which is 5 in. greater than that of the present electric model.

The design is based upon the provision of a gasoline motor and electric generator to provide current for the electric motor, either direct or through the intermediary of a storage battery. It includes a four-cylinder gasoline engine of Woods factory manufacture, an electric motor generator directly connected to the engine and a 20-cell storage battery of electric vehicle type.

At speeds below 10 to 15 m.p.h. the gasoline engine idles, being driven by the electric motor which drives the car and which receives its current from the storage battery. When it is desired to travel at higher speeds, the gasoline engine is brought into play and can be used either in conjunction with the storage battery or to supply current direct to the electric motor from the generator. The connections are such that when the engine is generating more than sufficient for running the car it automatically keeps the storage battery charged. The automatic cut-outs are arranged so that the battery charge is kept within the limits of dangerous undercharge, and sufficiently high charge to cause gassing.

Control of the whole car is by means of two small levers on the steering wheel which give all the forward and reverse speeds, the forward speeds being practically infinite in number. These controls also throw the gasoline engine into and

out of play and also operates the electric brake. The 20-cell battery has sufficient capacity to run the car without the assistance of the gasoline motor for 35 miles, so that it is independent to a certain extent of the gasoline power unit. The battery is approximately one-half the size of the average electric vehicle battery which usually has approximately 40 cells.

The addition of the gasoline engine and its accessories is more than offset by the reduced size of the battery and other weight economies and the new car weighs considerably less than the present purely electric Woods of the same model.

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St. Louis Plans Traction Show

ST. LOUIS, MO., Jan. 28—The National Tractor Manufacturing Association will give a demonstration with 100 tractors representing thirty-three factories in St. Louis July 31 to Aug. 5, 1916, it was announced here to-day by Frank E. Goodwin, chairman of the executive committee of the St. Louis Tractor Farming Association who was principally instrumental in bringing the demonstration to this city. Plans are being made for the accommodation of 50,000 persons.

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Ford Interests in Highland Park Bank

DETROIT, MICH., Jan. 29—The Highland Park State Bank of Detroit has filed its incorporation papers. Its capital stock is $500,000, and among those interested as stockholders are some of the best known men in the local automobile industry. Among them are: Henry Ford and his son, Edsel B. Ford; James Couzens, Frank L. Klingensmith, Horace H. Rackham, Walter L. Dunham, Henry S. Morgan, Charles A. Dean, John W. McMeans, James T. Whitehead and George R. Andrews. Mr. Couzens owns 3909 of the 5000 shares of the bank. The latter is in reality a branch of the bank of the same name in Highland Park, just across from the Ford Motor Co.'s plant. Most of the stockholders are the same in both banks.

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Detachable-Rim Inventor Dies

NEW YORK CITY, Jan. 31—Richard S. Bryant, factory manager of The Standard Welding Co., died recently, of cancer at the Post-Graduate Hospital.

He was one of the first to design a quick-detachable rim—a type still used to a large extent. He organized the Bryant Rim Company of Columbus, Ohio, which was later bought out by the Diamond Rubber Company of Akron.

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National Completes New Offices

INDIANAPOLIS, IND., Jan. 31—One of the two new buildings recently erected by the National Motor Vehicle Co. of Indianapolis was their new office and engineering building. This has been completed.

Anti-Trust Law Involves Dealers

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Attorney General Sues to Prevent Manufacturers from Limiting Territory

DALLAS, TEXAS, Jan. 30—Alleging violation of the Texas anti-trust laws, the Attorney General's department for the State of Texas Thursday afternoon filed suits in the Fifty-third Texas District Court at Austin against the Munger Automobile Co. of Dallas, the Olds Motor Works et al. of New Jersey, the Cadillac Motor Co. of Michigan and the Houston Motor Car Co. of Houston, Texas.

It is alleged by the State that the Olds Motor Works and Davis and Turney, its distributors in this State, violated the anti-trust statute by virtue of a sales contract made by them which limited and restricted the right of Davis and Turney to sell the cars purchased from the Olds Motor Works to a certain fixed territory. Similar allegations formed the basis of the suit against the Cadillac Motor Car Co. and its distributors or dealers, the Houston Motor Car Co. and the Munger Automobile Co.

The relief sought by the State is an injunction permanently restraining defendants from further carrying out alleged illegal contracts and from hereafter making similar contracts. No moneys or penalties are prayed for, because, in the opinion of the Attorney General, the facts fail to show any intention on the part of the parties involved to violate the law. The contracts containing the alleged illegal provisions complained of were prepared by the general attorneys of the foreign companies and were believed by the parties operating under them to be in compliance with the law.

Similar suits, it is understood, are to be filed against a number of other concerns. If the district courts sustain the State's contention in these cases, it means that a dealer cannot be restricted to sell automobiles in any territory set out by contract, but that he has the right to sell and distribute cars to any point in Texas.

Page Buggy to Build Front-Drive Truck

MARSHALL, MICH., Jan. 30—The Page Bros. Buggy Co., of this city is said to be perfecting the organization of a new company which will make a front-drive truck designed by E. H. Oversmith. The truck is to be assembled at the Page plant and a selling organization will be formed in Detroit from where the product is to be disposed. It is also stated that the new concern will be capitalized at $100,000 all of which has been subscribed.

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20,000 Chandlers for 1916

CLEVELAND, OHIO, Jan. 30—The Chandler Motor Car Co. has begun the construction of another large building adjoining the present factory buildings, in order to enlarge the various departments sufficiently to meet the needs of the increased output for 1916. It will have 25,000 sq. ft. of space and will be one story in height for the present, but the foundation and walls will be heavy and it will probably be increased to five floors later on, as the space is needed.

This company will produce 20,000 cars this year, which means an increase of more than 100 per cent over the output of 1915. Last year the increase was from 2000 to 8000. At the present time the factory is turning out fifty machines per day and through February it will complete 100 machines per day.

National Acme Capital Now $9,000,000

CLEVELAND, OHIO, Jan. 30—At the annual meeting of the National Acme Mfg. Co. Thursday the stockholders authorized an increase of capital stock from $2,500,000 to $9,000,000. Of the new stock $1,500,000 is 6 per cent preferred, while the remainder is common. The Cleveland Trust Co. purchased the entire block of preferred stock and disposed of it in a very short time at 102 to local investors. This stock is to be retired in ten equal installments of $150,000 each, beginning Jan. 1, 1917. A sinking fund will be established and the redemption price has been fixed at 103, or the entire issue may be called in at any time on proper notice at 105. President Alexander said that a substantial stock dividend will be announced later.

The stockholders formally authorized the purchase of the property and business of the Windsor Machine Co., Windsor, Vt., the consideration being $3,575,000. This company has been one of the strongest competitors of the local company and last year paid large dividends to its stockholders, who realized a handsome price in the deal just closed. The Windsor plant will be operated under its present management and its principal output will be single and multiple spindle screw machines.

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New Igniter for Fords to Be Made

DETROIT, MICH., Jan. 29—The Detroit Engineering Products Co., with a plant in South Bend, Ind., and the selling end of the business here in Detroit, was incorporated this week, the capital stock being $60,000. Among those interested in this concern which will make a new ignition system for Ford cars, are Earle Welborn, now assistant to Henry B. Joy, president of the Packard Motor Car Co.,

and formerly commercial car manager of the Dayton Engineering Laboratories Co.; Austin F. Bement, formerly advertising manager of the Electric Auto-Lite Co., Toledo, and now in charge of the national headquarters of the Lincoln Highway Association, Detroit; Charles A. Mattison, formerly of South Bend, Ind., an accessory salesman of many years of successful experience, who will be in charge of the active management.

The new product or rather the first of several new products will be an ignition system for Ford cars, utilizing the current from the Ford magneto and breaking it in such a manner, it is claimed, as to give the same effect as though a high tension magneto had been installed on the car.

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Allen to Manufacture Pressure System for Garages

NEW YORK CITY, Jan. 30—Wm. A. Allen, head of the Allen Auto Specialty Co., has formed the Allen Pressure System Co., with a capital of $10,000, to produce gasoline and oil-storage equipment for garages. Mr. Allen's latest product is called the Apsco system and is applicable in the pumping of gasoline or other liquids on any floor of a garage by means of pressure. This means that by leading pipes from the main tank under the garage to any part of the building, gasoline or any other fuel may be had at any time.

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95,000 Cars for Minnesota

MINNEAPOLIS, MINN., Jan. 31—Hennepin county leads in Minnesota for automobile registrations, with a total of 14,111. The second county is the one in which this city is situated, with 6135. The county of which Duluth is the seat, St. Louis, has 2747 cars. The Secretary of State estimates there are 95,000 cars in the State with the close of the old year, or nearly 40 per cent gain over 1914 when there were 68,500 cars registered.

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74,123 Cars Registered in Kansas

KANSAS CITY, MO., Jan. 29—Final figures for the car and truck registration in the State of Kansas for 1915 show a total of 74,123, of which about 4000 are trucks, and 8260 motorcycles. This means there is a car for practically every fourth family in the State. The licenses for these cars turned $331,812.75 into the road funds of the counties.

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Brazilian Exports Increase

NEW YORK CITY, Jan. 31—R. S. Noxon, manager R. G. Dun & Co., Rio de Janeiro, considers that Brazil at present has considerable prosperity in certain lines of business. He states that during the severe trade depression of the past two or three years—a depression contributed to by a certain degree of overtrading, by financial stringency, by the fall in the price of the two great exports, coffee and rubber, and, lastly, by the effects on Brazil of the European war—the commercial houses of Rio de Janeiro have shown a remarkable power of resistance against such unfavorable forces, and have withstood the severe strain in a most praiseworthy manner. Although weakness has resulted in some cases, for the most part the importing houses have consolidated their positions by reducing stocks, husbanding their resources, and restricting credits throughout the interior both in regard to amounts and time. These houses now give evidence of a very pronounced degree of solvency.

Official statistics of the exports of Brazil during the first ten months of 1915, as compared with the same period of 1914, show certain increases and decreases in total value. The exports of cotton declined $7,725,000; of rubber, $1,520,000, and of tobacco, $2,950,000. These declines, however, were more than offset by the following increases: sugar, $2,310,000; cocoa, $4,800,000; coffee, $17,675,000; hides, $4,320,000; yerba matte, $1,040,000 and pelts, $680,000. The total net increase in the value of exportations during the first ten months of 1915, as compared with a similar period in the preceding year, was $18,735,000. The total value of exports during the first ten months of 1915 was $209,235,000.

The importations of merchandise during the above ten months aggregated $124,905,000 in value, therefore, the favorable trade balance that Brazil has accumulated in the above period amounts to nearly $85,000,000.

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Rock Island Plow Buys Heider Mfg. Co.

ROCK ISLAND, ILL., Jan. 31—The Rock Island Plow Co. closed a deal this week by which it secures control of the Heider Mfg. Co. of Carroll, Iowa, including the Heider tractor and all rights connected with the patent and manufacture. The special machinery, patterns, templets, and all raw material owned by the Heider company is now being shipped to Rock Island. H. J. Heider, the designer and inventor, will be retained by the Rock Island company, and he and a number of his employees will remove to Rock Island and be placed in charge of the construction of this machine at the Rock Island plant. The Heider tractor was invented seven years ago, develops 10 hp. at the drawbar, sufficient to pull three 14-in. plows in any soil, and can haul two to three farm wagons to market. The tractor develops 20 hp. at the pulley, enabling it to run a threshing machine or other work designed for a 20-hp. gasoline engine. The Rock Island company marketed the Heider tractor last year in a jobbing way and largely oversold the output of the plant. The Carroll plant was handicapped by lack of space, shipping facilities and skilled labor, and a proposition to merge into the Rock Island company was favorably received.

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Velie Ships Trucks to France

MOLINE, ILL., Jan. 30—The Velie company this week shipped forty car loads of auto trucks to New York, for Havre, France, the largest single shipment of the kind ever made from this territory. A special train was required. The value of the consignment was $155,000. The company is maintaining a service station at Havre, in charge of James Gillespie, formerly connected with the Moline plant. A number of mechanics were sent abroad to be utilized in assembling the various parts. The Velie company reports an increase of 400 per cent in December business, as compared with the same month in 1914, due to a large extent to the war orders, although domestic consumption has also greatly increased.

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Body Plant for Lansing

LANSING, MICH., Jan. 28—The Gier Pressed Steel Co., which will place on the market a new one-piece metal car body, has contracted for the erection of a new factory building, 160 by 600 ft. which will be one of the largest body making plants in the country. The company will spend at least $150,000, it is said, on the new building and its equipment. There will be several new presses, one of which specially constructed for the Gier concern, will cost between $18,000 and $20,000. Provisions have been made for a large increase in the production of light sheet metal products which have contributed in making the concern. During the past year the business increased nearly 150 per cent over that of 1914, and the orders now on hand are at the rate or on a basis of nearly double the business of 1915.

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Addition Made by Standard Motor Truck

DETROIT, MICH., Jan. 31—An addition three stories high will be put up by the Standard Motor Truck Co. which will provide 60,000 sq. ft. of additional floorspace. Business during 1915 was more than double that of the preceding year.

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Rochester to Have Radiator Plant

ROCHESTER, N. Y., Jan. 31—With a capitalization of $200,000, papers for the Unitube Auto Radiator Corporation have been filed with the County Clerk. The company will occupy the building in University Avenue formerly used by the Jenkins Motor Co., and will manufacture a new type of radiator. The directors are: C. S. Cook, Fairport; H. F. Beardslee, E. M. Sparlin and D. S. Crawford, all of Rochester.

Factory Miscellany

Hall Lamp to Add—The C. M. Hall Lamp Co., Detroit, Mich., maker of automobile lamps, has increased its capital from $150,000 to $300,000. An addition to its factory is in course of erection.

Knapp Adds—The A. C. Knapp Co., automobile top builder, Mt. Elliott Avenue, Detroit, Mich., has arranged for the erection of a one-story addition to the plant which will almost double its present floor space.

Murphy Brass Specialties Co. to Move—The G. W. J. Murphy Co., Merrimac, Mass., maker of brass automobile specialties, will remove to Amesbury and occupy a plant on Carriage Hill, where 200 men will be employed.

Hoover Ball Adds—The Hoover Steel Ball Co., Ann Arbor, Mich., has let contracts for additions to its forge and tempering department and to its grinding department, and will also build an office building, all of concrete and brick.

Price Electric Devices to Build—The Price Electric Devices Corp., Waynesboro, Va., will establish a plant at Basic, Va., for the manufacture of lighting and ignition generators, starting motors and other automobile equipment. E. L. Eakle is general manager.

Detroit Parts Co. to Build.—The Turner & Moore Mfg. Co., Detroit, Mich., which makes automobile parts, has contracted for the erection of a factory building, 75 by 300 ft., on Addison Street, between Junction and McKinstry Avenues, near the M. C. R. R.

Gilmer Completes First Unit—The L. H. Gilmer Co., Philadelphia, Pa., maker of belts, has completed the first unit of its new factory and moved its office and manufacturing departments to the new site in Tacony, Philadelphia. It is arranging to break ground immediately for a second unit to be 50 by 200 ft.

Columbia Truck Starts New Plant—The banks in Pontiac, Mich., are now offering for sale $100 6 per cent debenture certificates to the amount of $6,500, which is the amount guaranteed as a loan to the Columbia Motor Truck Co., when this concern decided to move from Kalamazoo to that city. The raising of the money is now necessary as the real estate has been purchased and the new plant's steel works erected.

To Make Bumpers—The Booth Bumper Co., 1714 North Twelfth Street, Toledo, Ohio, has been incorporated by W. S. Booth, G. E. Smith and F. H. Greer. The authorized capital stock is $10,000. The purpose of the concern is to make wooden bumpers for automobiles after a patented design for which Mr. Booth is sponsor. A plant will be erected.

To Make Bodies—Enlargement of the scope of the business has been decided upon by the directors of the Excelsior Seat Co., Columbus, Ohio. For many years it has been engaged in the manufacture of seats and bodies for horse-drawn vehicles. Now it will add automobile bodies to the line. The special machinery is being bought and is to be installed at once.

Detroit Twist Drill Doubles Capacity—The large additions to the plant of the Detroit Twist Drill Co., 634 West Fort Street, Detroit, Mich., was completed Feb. 1. Beginning that date, the production of the company was doubled.

The Automobile Calendar

Jan. 29-Feb. 5....Columbus, Ohio, Show, Memorial Hall, Columbus Automobile Show Co.
Jan. 29-Feb. 5....Minneapolis, Minn., Show, National Guard Armory, Minneapolis Trade Assn.
Jan. 31-Feb. 5....Fall River, Mass., Show, State Armory, R. C. Borden, Mgr.
Feb. 1-5.....York, Pa., Show, York Auto Dealers' Assn.
Feb. 2-5.....Buffalo, N. Y., Show, Auditorium, Buffalo Automobile Mfrs. and Dealers' Assn.
Feb. 2-5.....Poughkeepsie, N. Y., Show, State Armory.
Feb. 7-12.....Kansas City, Mo., Show, J. I. Case, T. M. Bldg., Kansas City Motor Dealers' Assn.
Feb. 7-12.....Duluth, Minn., Show, Armory, Duluth Automobile Dealers' Assn.
Feb. 8-11.....Grand Forks, N. D., Show, Auditorium.
Feb. 8-12.....Freeport, Ill., Show, Freeport Auto Dealers and Garage Owners' Assn., Henney Buggy Plant.
Feb. 9-12.....Peoria, Ill., Show, Coliseum, Peoria, Automobile and Accessory Assn.
Feb. 12-19.....Albany, N. Y., Show.
Feb. 12-19.....Hartford, Conn., Show, First Regiment Armory, Hartford Automobile Dealers' Assn.
Feb. 14-19.....Nashville, Tenn., Show, Hippodrome. J. A. Murkin, Mgr.
Feb. 14-19.....Des Moines, Iowa, Show, Des Moines Auto Dealers' Assn.
Feb. 14-19.....Winnipeg, Man., Show, Ford Plant, Winnipeg Motor Trades Assn.
Feb. 16-19.....Rockford, Ill., Show. Coliseum, Motor Car Dealers Assn.
Feb. 17-19.....Racine, Wis., Show, Lakeside Auditorium.
Feb. 19.....Newark, N. J., Show, First Regiment, Armory, C. G. Fitzgerald, Mgr.
Feb. 19-26.....Harrisburg, Pa., Show, Emerson-Bruntingham Co.'s Bldg., Capital City Motor Dealers' Assn.
Feb. 20-27.....Grand Rapids, Mich., Show, Klingman Furniture Exhibition Bldg., Automobile Business Assn.
Feb. 21-26.....Bridgeport, Conn., Show, State Armory. B. B. Steibler, Mgr.
Feb. 21-26.....Louisville, Ky., Show, First Regiment Armory.
Feb. 21-26.....Omaha, Neb., Show, Omaha Automobile Show Assn.
Feb. 21-26.....Portland, Me., Show, Exposition Bldg.
Feb. 21-26.....South Bethlehem, Pa., Show, Coliseum. J. S. Elliot, Mgr.
Feb. 21-26.....Syracuse, N. Y., Show, Syracuse Automobile Dealers.
Feb. 22.....Los Angeles, Cal., Speedway Race, Ascot Speedway Assn.
Feb. 28-March 3..Pittsburgh, Pa., Convention of American Road Builders' Assn., Mechanical Hall.
Feb. 28-March 4..Paterson, N. J., Fifth Annual Show, Auditorium.
Feb. 29-March 4..Ft. Dodge, Iowa, Show, Terminal Bldg., Ft. Dodge Automobile Dealers' Assn.
March 4-11.....Boston, Mass., Car and Truck Show, Mechanics Bldg.
March 8-11.....Davenport, Iowa, Show, Tri-City Davenport, Rock Island & Moline; Tri-City Automobile Trade Assn.
March 8-11.....Mason City, Iowa, Show, Armory.
March 8-15.....Brooklyn, N. Y., Show, Brooklyn Motor Dealers' Assn.
March 9-11.....Kenosha, Wis., Show, Kenosha Retail Assn., Kenosha Farmers' Session.
March 15-18.....Trenton, N. J., Show, Armory, under auspices of Chamber of Commerce.
March 21-25.....Deadwood, S. D., Show, Auditorium, Deadwood Business Club.
March 28-April 3..Manchester, N. H., Show, Under Auspices Couture Bros. Academy.
April 10-15.....Seattle, Wash., Show, Arena.
May.....Chicago, Ill., Speedway Race for Amateurs, Speedway Park Assn.
May 6.....Sioux City, Ia., Speedway Race, Sioux City Speedway Assn.
May 13.....New York City, Vanderbilt Cup, Sheepshead Bay Speedway Race.
May 30.....Indianapolis Track Race.
June 10.....Chicago Track Race.
June 28.....Des Moines, Iowa, Track Race.
July 2-6.....Detroit, Mich., World's Salesmanship Congress, Detroit Board of Commerce Bldg.
July 4.....Coeur D'Alene, Idaho, Race Meet, Hilles-Riegel.
July 4.....Minneapolis Track Race.
July 4.....Sioux City Track Race.
July 15.....Omaha, Neb., Track Race.
Aug. 5.....Tacoma Track Race.
Aug. 18-19.....Elgin Road Race.
Sept. 4.....Des Moines Track Meet.
Sept. 4.....Indianapolis Track Race.
Sept. 16.....Providence Track Race.
Sept. 30.....New York City Sheepshead Bay Race.
Oct. 7.....Omaha Track Race.
Oct. 14.....Chicago Track Race.
Oct. 19.....Indianapolis, Ind., Race, Indianapolis Motor Speedway.

The Week in the Industry

Torrey Detroiter Assistant Sales Mgr—Alfred O. Dunk, president of the Detroiter Motor Car Co., this city, announces the appointment of D. H. Torrey as assistant sales manager of his company, the appointment effective at once.

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Dealer

Denby Salesmanship Course Winner—The Denby Motor Truck Co., Detroit, Mich., has awarded first prize to A. W. Boulden, Seattle, Wash. The award is the first in a series of monthly contests to extend over the year covered by a course of instruction in salesmanship and truck operation furnished free to owners and their employees of that company.

Trade Items from Minneapolis—The Northwestern Automobile Co. began this week construction of a $75,000 service and sales building. It is to be two stories with full basement.

The Whitcomb-Littlewood Auto Co., 30 Eighth Street N., has been formed to handle the Davis car by J. C. Littlewood, formerly sales manager for the Winton Co. branch here, and F. B. Whitcomb, for 30 years in the hay and feed business. Mr. Littlewood for 8 years was district representative and branch manager with the F. B. Stearns Co.

L. E. Rice of Cedar Falls, Iowa, has been transferred to take charge of the new branch of the American Tire & Rubber Co. at 41 Eleventh Street S.

Atlanta Trade Items—The new building of the Goodyear Tire & Rubber Co., Peachtree Street just north of Baker, Atlanta, Ga., is nearing completion and will be ready for the occupancy of the concern within the next few days. J. T. Taylor, manager of the Atlanta branch, is completing preparations to remove his stock and equipment as soon as the new building is turned over to him.

That the Reo company is negotiating for a site for a plant at this city is a rumor which has created a great deal of interest in automobile circles of the city. It is stated that representatives of the concern have held a number of conferences with local real estate men within the past few days with a view of securing information as to the possibility of purchasing a suitable factory site here.

R. N. Matin, general manager of the Oakland Southern Co., announces that his headquarters will be removed from 45 Auburn Avenue to 453 Peachtree Street. The retail sales of Oakland are to be handled by Boykin and Gilbert from the same Peachtree location.

Motor Men in New Roles

Beck Leaves Chicago Chalmers—G. V. Beck has resigned as district sales manager in Chicago, Ill., for the Chalmers Motor Co., Detroit, Mich.

James Keys Ring V.-P.—L. S. James, formerly manager of the Hood Tire Co. of St. Louis, has become vice-president and sales manager of the Keys Piston Ring Co. of that city.

Ferwin New York Oil Rep.—H. S. Ferwin has been appointed representative in eastern Washington for the New York Lubricating Oil Co., with headquarters in Spokane, Wash.

Porter Heads Braender Branch—The Braender Rubber & Tire Co., Rutherford, N. J., has opened a new branch in Philadelphia, Pa., at 1327 Race Street, in charge of W. L. Porter.

Gartley Maxwell Rep.—P. C. Gartley of the Maxwell Motors Corp. is now located in Seattle, Wash., and will act as factory representative and cover the States of Washington and Idaho.

Smith Lee Tire Superintendent—F. H. Smith, formerly with the Federal Rubber Co., Milwaukee, succeeded A. J. Pennington recently as superintendent of the Lee Tire and Rubber Co., Spring Mill, Pa.

Weaver Goes to Sun—H. G. Weaver, formerly sales manager of the Newell Motor Car Co. of St. Louis, has been appointed assistant general sales manager of the Sun Motor Car Co. of Elkhart, Ill.

Conn Joins Cassidy—C. F. Conn, well known throughout the automobile accessory trade in northern and central New York, on Feb. 1 became associated with the Edward A. Cassidy Co., Inc., sales managers for the Long Horn G-P Muffler cut-out and Cassco engine-driven tire pump.

Parsons Takes on Stutz—The Washington state distributing agency for the Stutz car has been taken by J. W. (Jim) Parsons, well known automobile racer, and his brother, G. M. Parsons, who have established headquarters in Seattle under the name of the Stutz Motor Car Co. of Washington.

McKay Back on Seattle Row—W. O. McKay is again on the Seattle automobile row, during the past week having assumed the management of the Newton Foster Co., distributor of Paige and National cars. Mr. McKay some four years ago was managing partner of the Thomas-McKay Co., distributor of the Locomobile.

Whittaker Dyneto European Rep.—Benjamin Whittaker has been appointed European representative of the Dyneto Electric Co., Syracuse, N. Y. His headquarters are at 2 Norfolk Street, Strand, London, W. C.

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Dealer

Continental Motor Truck Opens Office—The Continental Motor Truck Co., Detroit, Mich., has opened an export office at 17 Battery Place, New York City.

Represent Acme Die Castings—Weidermiller and Ewald, Detroit accessory sales agents, are distributors for the States of Michigan and Ohio for the Acme Die Castings Corp., Brooklyn, N. Y.

Hodgman Rubber Offices Moved—The Hodgman Rubber Co. has moved its general offices, located at 806 Broadway, New York City, to Tuckahoe, N. Y., where its factory is located. The New York sales offices are at 8 West Fortieth Street.

Denver Trade Happenings—Tom Botterill, 1272-1278 Broadway, Denver, distributor for the Pierce, Hudson and Dodge in a large section of the mountain territory, has planned a new building for increased serve. It will be 50 by 125 ft. He will extend from his present building the remainder of the block over to Lincoln Street.

Ford's Wis. Convention March 1—Although the new Milwaukee plant of the Ford Motor Co. opened for business on Thursday, Jan. 27, the formal and official opening has been scheduled for March 1, when Henry Ford will come to Milwaukee. On this occasion all Ford dealers in Wisconsin will be invited to a convention. It is stated that the entire output will be for Wisconsin distribution only.

Milwaukee Changes—The Hoppe-Hatter Motor Co., 543 Broadway, Milwaukee, has been appointed city agent for the Buick in Milwaukee. The appointment is a new departure, the Milwaukee branch of the Buick Motor Co., 160 Wisconsin Street, having handled retail business in the city of Milwaukee since its establishment. G. G. Lund has been appointed agent for Wauwatosa and other suburban points in Milwaukee county. The Hoppe-Hatter Co., long agent for the Rauch & Lang-Baker electric, has also been appointed distributor of Owen Magnetic cars.